THE IRON TRADE REVIEW

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HIGHER PRICES

ANNOUNCED ON SHEETS, TIN PLATE AND OTHER FINISHED PRODUCTS.

Extensive Plans for New Construction by the Steel Corporation in the Pittsburg and Youngstown Districts.—Bar Iron Weaker.

The principal features of the week have been the advances of prices of a number of finished products and the announcement that the Steel Corporation will make extensive additions to plants in the Pittsburg and Youngstown districts. With the exception of a slight weakness in bar iron and scrap, the market continues extremely strong.

The heaviest buying of pig iron recently has been by steel casting interests which have placed orders freely for Bessemer; pipe concerns which have taken a heavy tonnage of No. 3 and No. 4 foundry grades, and steel making companies which have bought large quantities of basic. During the past ten days not less than 75,000 tons of basic have been purchased in eastern markets, of which 48,000 tons were for the Pencoyd plant of the American Bridge Co. The purchases of Bessemer by the manufacturers of rolled steel products have not been very heavy, and reports that the Steel Corporation has covered for its requirements for three months of the year are not confirmed. While some southern iron has been sold on the basis of $14.00 Birmingham on especially desirable business the usual quotation is at least 25 cents higher, and $14.50 is freely paid in some markets; especially in Chicago. While, as a rule, foundrymen feel that prices will not go higher and that there is a chance for a decline, furnaces are not disposed to make concessions to obtain contracts for the last half of the year, and little business is being done for that period.

Advances of prices in finished materials are as follows: $2.00 per ton on common sheet products, $1.00 on blue annealed sheets and 10 cents per base box on tin plate; galvanized corrugated roofing 10 cents; spikes $2.00 per ton; wire products, $1.00 per ton. The demand for spikes and bolts has been very heavy, and a leading western producer, having sold three-quarters of this year's product, withdrew from the market. The demand for wire products is also excellent. Structural material shows continued strength, and some heavy business is pending.

The close relation of bar iron and scrap is reflected in a common weakness. Bar iron has declined so that some mills are now selling at $37.50 per ton, Chicago and similar declines are noted in other market centers. Having learned from past experience that contracts for bars are not adhered to in times of depression, many mills have hesitated to make contracts for scrap at recent quotations, and some of them have not covered for their requirements. There is, however, no indication of a permanent depression in the market for bars.

Although the weather within a few days has been rather severe, coke prices continue somewhat irregular, but the demands in some districts have improved. Unless weather conditions should interfere greatly with delivery of coke, high prices feared some time ago will not prevail.

EXTENSIVE IMPROVEMENTS

Planned By the Steel Corporation Will Greatly Increase Capacity—1905 Broke Records.

(Special Telegram.)

New York, Jan. 10.—The blast furnace production of the United States Steel Corporation for 1905 was approximately 10,175,500 tons of pig iron; the production of ingots was 11,995,000. The best previous record was in 1902 when 7,975,500 tons of pig iron and 9,745,000 tons of ingots were produced. The increase is more than 2,000,000 tons in both iron and ingots.

The improvements decided upon include extensive new construction and the remodeling of a number of plants. This will increase the furnace capacity by 1,000,000 tons, the ingot capacity by 540,000 tons and the finished material capacity by 765,000 tons.

The principal items of the improvements are the erection of two new blast furnaces at the Carrie plant and of ten fifty-ton open-hearth furnaces at Homestead, Pa., where the structural mill will also be remodeled and its production largely increased. At Duquesne a bar mill for rounds up to six inches will be erected. Isabella furnace No. 2, which has been idle since the formation of the Corporation, will be placed in blast.

At South Chicago the Corporation will erect a new 30-in. universal plate mill and a new light rail mill. Another blast furnace is to be added to the Joliet plant. At the Worcester plant of the American Steel & Wire Co. large additions are planned for the manufacture of insulated wire and cable. The Pennsylvania plant of the National Tube Works at McKeesport will be remodeled so as to increase the capacity greatly and large additions will be made at the Pencoyd plant where the structural mill will be remodeled.

Activity at the Stevenson.—The year 1906 promises to be one of great activity at the great Stevenson mine of Corrigan, McKinney & Co., on the Mesabi. A contract for the shipping of 1,250,000 cubic yards has just been awarded the Drake & Stratton Co., and the shipments next season will be very heavy, possibly exceeding those of 1905, which amounted to 1,428,614 tons.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Important Additions to be Made by the Steel Corporation —Prices of Sheets, Tin Plate and Wire Advanced.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, January 9.

That part of the business upon which improvement is possible has picked up considerably since the holidays, but the sharp improvement which might have been noticeable other years was not so evident this year as formerly on account of the steady continuation throughout the holiday week of business which did not make itself felt on former occasions. In finished lines business is at the top of the wave with mills working to capacity and tonnage output being limited only to that extent made necessary by the continued scarcity of raw and semi-finished products. In many lines it is impossible to get prompt delivery except in favored instances where old and large customers are in absolute need and mills make an effort to accommodate. The instances where premiums are paid for quick delivery are comparatively few, as the leading interests have to a great measure discouraged the premium plan although some independent mills are taking them.

The new structural mill of the Jones & Laughlin Steel Co., will probably be ready by Feb. 1 and it is estimated the capacity when in operation will be 1,000 tons per day of 24 hours. The company has rushed the work to the limit and will establish a construction record never equaled in a mill of this size. On Sept. 21, last, the plans had not been made, but after it was decided to build the mill the first ground was broken and all engine beds laid Oct. 1, and the great train of rolls, five-eighths of a mile long, will be started just four months after ground was broken for the great plant.

The expected advance in wire and wire products was announced, effective last Monday. It was 5c per hundred, or $1 per ton. The American Sheet & Tin Plate Co., announced an advance, effective the same date, of $2 per ton on all common black sheet products and 10c per base box on tin plate. Galvanized corrugated roofing was advanced 10c per square for No. 28 and blue annealed sheets were advanced 5c per 100 pounds. Painted corrugated roofing was not advanced.

The largest item of news during the week was the announcement that the board of directors and finance committee of the United States Steel Corporation has passed an appropriation amounting to approximately $7,000,000 for additions to the Homestead and Rankin plants of the Carnegie Steel Co., and providing for the construction of two blast furnaces to be added to the Carrie group at Rankin, which is considered a part of the Homestead plant although on the opposite side of the Monongahela river; it is connected by a bridge used exclusively by the corporation. In addition to the blast furnaces the appropriation provides for ten new open-hearth furnaces with provision for the addition of four more, the rebuilding of two structural mills and one plate mill. Other improvements will be made at Youngstown and Sharon, but the plans are not yet in such shape that they can be announced.

Pig Iron.—While actual reported sales have not been anything to excite comment, there has been a great deal of quiet buying which has not been made public on account of the tendency it might have on the market in the way of advancing prices. The leading interests have so far succeeded in holding the market within bounds and that this should continue rather than a boom is the object sought in making the quiet deals. From various sources it has been reported that the corporation has bought 30,000 tons for each month of the second quarter, but this is denied by those who should be in position to know actual conditions.

From half a dozen furnaces the Massillon Iron & Steel Co. has purchased approximately 22,000 tons of pig iron, 75 per cent of which was southern on a basis of $14.25, Birmingham. The remainder was northern iron. One thousand tons of No. 2 foundry was sold for March, April and May delivery at $17.50, valley and since the first of the year probably 7,500 tons of Bessemer for first quarter was sold at prices ranging from $17.50 to $17.65, valley. We quote:

Bessemer Valley	$17.60 to 17.75
Bessemer, Pittsburg	18.45 to 18.60
No. 1 Foundry, Pittsburg	18.60 to 18.95
No. 2 Foundry, Pittsburg	18.25 to 18.45
Gray Forge, Pittsburg	17.10 to 17.60
Basic, Valley	17.45 to 17.60
Basic, Pittsburg	18.30 to 18.45

Ferro-Manganese.—There is no real market price on ferro-manganese, foreign, 80 per cent, and the selling price by those who may have it for prompt delivery depends upon how badly the consumer really needs the material. As high as $175 per ton has been secured, but the nominal market is probably about $150.

Skelp.—There has been no change in prices and but very few deals, and these for small quantities, have been made. We continue to quote, nominally: Bessemer, grooved, 1.65c to 1.70c; sheared, 1.70c to 1.75c; basic, grooved, 1.65c to 1.70c; sheared, 1.70c to 1.75c; iron, grooved, 1.65c to 1.70c; sheared, 1.80c.

Muck Bar.—We continue to quote $32 nominally, as there have been no sales upon which to base a market quotation. The Shenango Iron & Steel Co., at Wheatland, Pa., expects to be a producer about the third week of the present month.

Structural Material.—Conditions have not changed although new business continues to be taken steadily and at prices which have ruled for several months. The new structural mill of the Jones & Laughlin Steel Co., will be started Feb. 1 and its capacity of 1,000 tons of finished material every 24 hours will greatly help out present conditions.

The new Uniontown & Wheeling Short Line railroad has let the contract for the construction of its bridge over the Monongahela river at Rice's landing. The contract was awarded to the American Bridge Co. for the construction work, but with the unusual precedent established of Jones & Laughlin, instead of the United States Steel Corporation supplying the structural shapes. We continue to quote:

Beams and channels, 15 inches and under, 1.70c; over 15 inches, 1.80c; zees, 1.70c, 1.75c; angles, from 3 to 8 inches, inclusive, 1.70c; universal and sheared plate, 6¼ inch and wider, 1.60c, base.

Billets.—With but few sellers in the market Bessemer billets are quoted strong at $27 and $27.50 has been obtained. A lot of over 1,000 tons has been offered at $27.25.

Plates.—The steady run of specifications continues and in this line the scarcity of semi-finished open-hearth steel has been felt to the extent that mills have not been operating to their tonnage capacities on account of inability to get the steel.

We continue to quote: Tank plate ¼ inch thick, 6¼ inch to 100 inches, 1.60c, f. o. b. mill, Pittsburg. Extras

are as follows per 100 pounds: flange and boiler steel, 10c; marine, A. B. M. A. and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 inches up to 110 inches in width, not less than 5c extra; plates 110 inches to 115 inches wide, not less than 10c extra; 115 to 120 inches, not less than 15c extra; plates 120 inches to 125 inches wide, not less than 25c extra; plates 125 inches to 130 inches, not less than 50c extra; plates 130 inches wide, not less than $1 extra; plates 3-16 inch thick, 10c extra; gauges 7 and 8, 15c extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific coast.

Merchant Steel.—The makers of agricultural implements are enjoying the greatest prosperity and with the car companies and railroads are still heavy buyers of merchant steel, and indications are that they will be for some time to come. Shafting manufacturers report a very satisfactory condition of affairs and the principal tool steel interest has unusually heavy tonnage on its books. In sympathy with other finished lines the tendency of prices is upward and higher than quoted prices are being obtained in many lines, although no official announcement of an advance has been made. We quote: Cold rolled and ground shafting, 50 per cent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c to 1.80c; open-hearth spring steel 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.05 to 2.10c. The price of planished and machine straightened tire is 1.70c base half extras as below. Iron finished tire up to 1½ inch by ½ inch, 1.65c base half extra tire list. Iron finished tire 1½ inch by ½ inch and over to be sold on regular bar basis of 1.50c base, half extra steel card.

Pipes and Tubes.—With business good in practically all lines and new tonnage being booked regularly and in fair volume, conditions have not changed much from what they have been for the past six months. We continue to quote:

	Steel		Iron	
Consumers' Carloads	Black	Galv.	Black	Galv.
⅛ and¼ inch	71	55	68½	52½
⅜ inch	73	59		
½ inch	75	63	79½	69½
¾ to 6 inches	79	69	77	67
7 to 12 inches	74	59	72	56½
EXTRA STRONG PLAIN ENDS.				
¼ to ¾ inch	64	52	61½	49½
½ to 4 inches	71	59	68½	56½
4½ to 8 inches	67	55	64½	52½
Double extra strong plain ends, ½ to 8 inches	60	49	75½	49½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron
1 to 1¼ inches	44	41
1¼ to 2¼ inches	56	41
2½ inches	58	46
2¾ to 5 inches	64	53
6 to 13 inches	56	41

Less than carload lots two points less.
¼ inch and smaller, over 18 feet, 10 per cent net extra.
2¼ inches and larger, over 22 feet, 10 percent net extra.

Wire and Wire Nails.—The advance which has been expected for the past six weeks was announced and became effective Jan. 8. The advance was $1 per ton on all lines. A still further advance is expected before the end of the present month. The business in wire and wire products is particularly good, in fact there has not been so good a feature in the market for a long time past. It has not been necessary to make price inducements in order to get business and the mills all have enough on the books to keep them going for a considerable time to come.

We quote: Wire nails, jobbers' carload lots, $1.85; retailers' carload lots $1.90, and less than carloads $2; painted barb wire; $2 for jobbers in carloads; retailers in carloads $2.05, and less than carloads $2.15, with 30c for galvanizing; plain wire $1.70 to jobbers and $1.75 to carload buyers. Annealed smooth fence wire is held at $1.70 with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg 60 days with 2 per cent discount for cash in 10 days. Iron and steel cut nails $1.80 to $1.85.

Rods.—Rods are quoted nominally at $37 to $38, but they are scarce and some makers are entirely out of the market and will make no quotations whatever.

Sheets and Tin Plates.—Effective on Monday of this week, the American Sheet & Tin Plate Co.. announced an advance of 10c per base box on tin plate, 10c per square for No. 28 galvanized roofing, 10c per 100 pounds on black sheets, and blue annealed sheets were advanced 5c per 100 pounds. This is the second advance of 10c per base box on tin plate within less than two months, the other being announced effective Nov. 20. Business has been very heavy and continues without cessation. The supply of sheet bars has curtailed output and the effect of the Carnegie Steel Co., putting its Ohio works at Youngstown on sheet bars will not be felt for some time, as the corporation was far behind on its contracts to subsidiary and outside interests and it will take some time to catch up. We quote:

American Bessemer steel sheets, box annealed, cold rolled, one pass: Nos. 11-12, 2c; Nos. 13-14, 2.05c; Nos. 15-16, 2.10c; Nos. 17-21, 2.15c; Nos. 22-24, 2.20c; Nos. 25-26, 2.25c; No. 27, 2.30c; No. 28, 2.40c. Galvanized, Nos. 10-11, 2.35c; Nos. 12-14, 2.45c; Nos. 15-16, 2.55c; Nos. 17-21, 2.70c; Nos. 22-24, 2.85c; Nos. 25-26, 3.05c; No. 27, 3.25c; No. 28, 3.45c. Corrugated roofings, 1.70c per square for No. 28 painted, 2½inch corrugation; 3.05 per square for No. 28 galvanized, 2½ inch corrugation. Quotations f. o. b. Pittsburg on large lots.

Rails and Track Material.—Light sections continue to be in great demand at the advanced price and a considerable tonnage has been booked. The business in standard sections, while it has not been particularly heavy to mills in this district, has amounted to between 17,000 and 20,000 tons during the week and several large contracts are pending. The scarcity of billets and bars has made it necessary to take two mills off rails and put them on semi-finished material and this will for a time, or until the leading interests have caught up with orders for billets and bars, to some extent retard delivery in a small way on rails. We quote: Fifty pounds and heavier, 500 ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails, 16 pounds, $30; 20 pounds, $28.50 to $29; 25 to 45 pounds, $28; angle bars for standard sections, 1.50c; spikes, $2.

Merchant Bars.—During the past week the movement in bar iron has been light. Very few sales have been reported and these have been on small tonnages. Rumors have been current that eastern bar manufacturers have been in the Pittsburg district offering iron considerably lower than that offered by local mills but as far as can be learned no sales were put through. We continue to quote:

Common iron bars, 2c, Youngstown; 2.05c, Pittsburg; hoops, 1.85c in carload lots, and 1.95c in less than carload lots, with regular hoop card for extras. Bands, 1.50c; Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees under 3 inches, 1.60c all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 10c advance; less than 1,000 pounds of a size, 30c advance.

Old Material.—The scrap business has not picked up any since the holidays and the lifeless condition which characterized it for the past month or six weeks still pre-

vails. If anything, the prices are not as strong as they were last week. We quote:

Heavy melting stock, $17 to $17.50; old steel rails, long lengths, $18 to $18.50; No 1 cast scrap, $15 to $15.50; heavy cast scrap borings, $10.50 to $10.75; bundled sheet scrap, $15.50 to $15.75; No. 1 wrought scrap, $20.50 to $21; low phosphorus scrap, $20 to $21.

Coke.—The inquiry for foundry coke has not been very strong during the past week and for spot delivery foundry is quoted $3.40 to $3.65 and furnace coke $2.65 to $2.75. There has been some congestion on account of the recent bad weather and many of the plants are not yet shipping fully to expectations on account of a slight car shortage and some slowness in moving by the railroads. For the week ending Dec. 30 the estimated production was 232,343 tons in the Connellsville region and 82,095 in the lower Connellsville region. The production took a slump on account of the Christmas holiday and but few works were active on Christmas day. The output of the region is practically contracted for through the first quarter.

CHICAGO.

Prices of Wire Products Advanced—Higher Freight Rates from the South—Bar Iron Prices Lower.

Office of *The Iron Trade Review*,
1164 Monadnock Block, January 9.

The market is slow in recovering from the holiday apathy. The period since the first of the year has been largely devoted to preparatory work, and negotiations for new wants have proceeded slowly. Inquiry is broadening, however, but except on pig iron and the lighter forms of finished material, it cannot have much effect on the present conditions other than to add to the congestion that already exists. Structural, rail and plate mills are practically out of the market for the next six or nine months, and whatever new business is placed is accepted without any guarantee of delivery. The demand for spikes and bolts has also been exceedingly heavy in the last four weeks, and the leading western producer after having sold three-quarters of this year's output has withdrawn from the market. Spikes have since advanced $2 a ton, making a total advance of $4 in one month. As was expected for some weeks, wire products were yesterday advanced $1 a ton, making the price of wire nails $1.85 Pittsburg. Bar iron has weakened in sympathy with the softness of scrap, and is now quoted at 1.82½c Chicago by several western mills. The most interesting feature of the pig iron market is the advance of 20c a ton in the freight rate from Virginia furnaces and the announcement that, commencing March 1, the freight rate between Birmingham and the Ohio river will be raised 25 cents a ton, making the latter $3.90 to Chicago. With the advance in Virginia irons on Jan. 1, of 50 cents a ton and the increased freight rate, this product is now quoted in Chicago at $18.85 for No. 2 foundry. Other southern irons are strong at $14.50 Birmingham, and northern grades at $19.25 Chicago.

Pig Iron.—It is yet too early to expect any marked change in the pig iron market. With the dawn of every year, a dull period of one or two weeks is always experienced, and 1906 is no exception to this rule. The inquiry, however, is of sufficient proportions to justify the belief that a considerable tonnage will shortly be placed. Quite a number of contracts expired with the close of the year, and with the increased melt and the delay in shipments there is lying dormant in this market a want of sufficient proportions to create an active buying movement, which will be started as soon as the proper moment arrives. This will not be, however, until buyers are assured that present prices are permanent. Producers are not pressing their customers to cover, and while they have practically ceased trying to get $15, they are holding firm at $14.50 Birmingham for No. 2 foundry, and northern interests at $19.25 Chicago for No. 2.

The car scarcity and labor stringency in the Birmingham district remain acute, and a considerable tonnage of iron has been accumulated in furnace yards. Our quotations follow:

Lake Superior Charcoal	$20 00 to 20.50
Northern Foundry No. 1	19.75 to 20.00
Northern Foundry No. 2	19.25 to 19.50
Northern Foundry No. 3	18.75 to 19.00
Northern Scotch Foundry	20.00 to 20.50
Ohio Strong Softeners No 1	20.30 to 20.80
Ohio Strong Softeners No. 2	19.80 to 20.30
Southern Foundry No. 1	18.65 to 19.15
Southern Foundry No 2	18.15 to 18 65
Southern Foundry No 3	17.65 to 18.15
Southern Foundry No. 4	17.40 to 17 90
Southern No 1 Soft	18.65 to 19.15
Southern No. 2 Soft	18.15 to 18.65
Southern Gray Forge	16.65 to 17 15
Southern Mottled	16.40 to 16.65
Southern Silveries (4 per cent to 6 per cent Silicon)	19.15 to 19 65
Jackson Co. Silveries (8 per cent to 10 per cent silicon)	23.30 to 24.30
Alabama and Georgia Car Wheel	22.65 to 23.15
Malleable Bessemer	19.50 to 20.00
Basic Iron	18.90 to 19.15

Billets.—At the expense of tiresome reiteration, we have to report that there is no change in the local situation. Demand continually exceeds the supply, and the price of forging billets is firm at $35 Chicago. Wire rods are without change in price, though very scarce, and are quoted at $33 Pittsburg, and $34 for chain rods.

Bars.—The softness of the scrap market has resulted in some weakness in bar iron. It is now quoted at 1.82½c Chicago, which represents a drop of 50 cents a ton. The leading maker, however, continues to hold out for 2c. Buying was light in the week under review, though specifications are as active as ever. Steel bars are moving freely and prices are strong. There is no fear entertained of a shortage in this product and premiums are no longer heard of. We quote carload lots, mill shipments, Chicago delivery, as follows: Bar iron, 1.82½c to 2c; soft steel bars and bands, 1.66½c half extras; soft steel angles less than 3 x 3, 1.76½c; hoops, 2.01½c; base, full extras; hard steel angles, 1.70c to 1.80c. Jobbers' prices are firm as follows: Bar iron, 2c to 2.10c full extras; soft steel rounds and squares, 2 inches and larger, $2 per 100 pounds base; flats, 2 inches and 4 inches by 1⅛ inch and thicker, $2 per 100 pounds base; flats, 4½ inches x 5 inches and 6 inches x 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half ovals and half rounds, $2 per 100 pounds base; steel bands, 1.95c to 2c half extras; soft steel hoops, 2.30c to 2.40c full extras. Other sizes not mentioned above, $1.85 per 100 pounds base, plus half extras.

Sheets.—The heavy volume of specifications is the most noteworthy feature of the trading in sheets. There is no hesitancy expressed in taking up full contract quotas, and as the material goes into immediate consumption it bespeaks a healthy condition of the subsidiary trades. Galvanized quotations are very firm, and 3.51½c Chicago is the minimum price for No. 28 gauge. Light black sheets, however, can still be purchased at $1 less than the official price. We quote carload lots, mill shipments, Chicago delivery, as follows: Blue annealed, Nos. 8, 9, 10, 1.86½c; Nos. 11-12, 1.91½c; Nos. 13-14, 1.96½c; Nos. 15-16, 2.06½c. Box annealed, Nos. 18-20, 2.16½c to 2.22½c; Nos. 22 and 24, 2.22½c to 2.26½c; Nos. 25 and 26, 2.26½c to 2.31½c; No. 27, 2.31½c to 2.36½c; No. 28, 2.41⅛c to 2.46½c; No. 29, 2.55½c to 2.61½c. Jobbers report a good business and that store prices are firm. We quote as follows: No. 10, 2c to 2.10c; No. 12, 2.05c to 2.15c; No. 14, 2.10c to 2.20c; No. 16, 2.20c to 2.30c; Nos. 18 and 20, 2.40c to 2.50c; Nos. 22 and 24, 2.45c to 2.55c; No. 26, 2.50c to 2.60c; No. 27, 2.55c to 2.65c; No. 28, 2.65c to 2.70c; No. 30, 3.15c to 3.35c.

Quotations on galvanized sheets, mill shipments, carload lots, Chicago delivery, are as follows: Nos. 10 and 11, 2.41½c; Nos. 12 and 14, 2.51½c; Nos. 15 and 16, 2.61½c; Nos. 17 and 21, 2.76½c; Nos. 22 and 24, 2.91½c; No. 26,

3.11½c; No. 27, 3.31½c; No. 28, 3.51½c. From store, galvanized sheets are quoted as follows: Nos. 10, 12 and 14, 3c to 3.10c; Nos. 16, 18 and 20, 2.90c to 3c; Nos. 22 and 24, 3.05c to 3.15c; No. 26, 3.25c to 3.35c; No. 27, 3.45c to 3.55c; No. 28, 3.65c to 3.75c.

Plates:—Specifications and new tonnage have been very free in the last ten days, and the leading western producer has filled itself up for some months. There is a good demand for small lots from store and warehouse prices are reported very strong. We quote mill shipments, Chicago delivery, as follows:

Tank steel, ¼-inch and heavier, up to 100 inches wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base; all full extras. Plates 3-16 inch thick, $2 extra; gauges, 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Local jobbers report a stiff demand from stock.

Prices are very firm. We quote tank steel, ¼-inch and heavier, up to 72 inches wide, 2c to 2.10c; 72 inches to 96 inches wide, 2.10c to 2.20c; 3-16 inch up to and including 60 inches wide, 2.10c to 2.20c; 3-16 inch to 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.25c; flange steel, 25c extra; heads, 25c extra.

Structural Steel.—No cessation is noted in the tremendous consumption of structural shapes. The congestion of specifications on mill books is without any improvement, and it will be at least six to nine months before new tonnage can be delivered. The contract for the additions to the Auditorium annex has been let, the steel requirements being about 2,500 tons. Prices are very strong, and for immediate delivery varying premiums are obtained. We quote mill shipments, f. o. b. Chicago, as follows:

Beams and channels, 3 to 15 inches, inclusive, 1.86½c; angles, 3 to 6 inches, 1.86½c; angles, larger than 6 inches, on one or both legs, 1.96½c; beams, larger than 15 inches, 1.96½c; zees, 3 inches and over, 1.86½c; tees, 3 inches and over, 1.91½c, with the usual extras for cutting to exact lengths, punching, coping, bending, or other shop work. Quotations on lots from store are as follows: All angles, 3 inches and larger, $2.25 per pound base; tees, 3 inches and larger, $2.30 per 100 pounds base; 3, 5, 9, 12 and 15-inch beams, $2.25 per 100 pounds base; 4, 8 and 10-inch beams, $2.50 per 100 pounds base; 6, 7, 18, 20 and 24-inch beams, $2.75 per 100 pounds base; 3, 4, 9, 12 and 15-inch channels, $2.25 per 100 pounds base; 6, 7, 8 and 10-inch channels, $2.50 per 100 pounds base; 5-inch channels, $2.75 per 100 pounds base.

Rails and Track Supplies.—The heavy tonnage of spikes and bolts on the books of the leading western producer, amounting to three-quarters of its 1906 output, has forced it to withdraw from the market. The trading in all forms of track supplies has been exceedingly heavy since the movement in standard sections started, but reached its climax in December. Spikes advanced $4 a ton in one month, being quoted today at 2.10c Chicago. Light rails, for which the demand has been very brisk, are also very strong in price.

We quote as follows: Heavy sections, f. o. b. mill, $28; light rails, f. o. b. Milwaukee mill; 12-pound sections $31; 16-pound, $30; 20-pound, $29; 25-pound, $28; 30 pounds and heavier, $27 to $28. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.75c; spikes, 2.10c; track bolts, 3¼ x ¾, with square nuts, $2.50 to $2.60 per 100 pounds; with hexagon nuts, $2.65 to $2.80.

Merchant Steel.—There is no lack of tonnage coming forward. Every mill has all the business it can handle, and though the entire output goes into immedate consumption the supply is far from meeting the demand. Prices are very strong. We quote mill shipments, f. o. b. Chicago, as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c to 2.40c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21c; railway spring, 1.86½c. Cold rolled shafting 65 and 2½ per cent off to dealers, 50 per cent off in carload lots and 45 per cent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up.

Cast Iron Pipe.—Bids will be submitted this week on a municipal inquiry from St. Paul, Minn. for 1,500 tons; on one from Minneapolis for 1,200 tons, and one from Bismark, N. D. for 800 tons. No new tonnage has been booked this week. Specifications are numerous. Prices are without change. We quote carload lots, f. o. b. Chicago: 4-inch water pipe, $31; 6, 8, 10 and 12-inch, $30; larger sizes, $29.50; gas pipe, $1 extra.

Merchant Pipe.—There is little of interest to report regarding this product. Prices are without change and new tonnage is of light volume. Specifications are improving, jobbers laying in stock for the spring trade. We quote carload lots, f. o. b. Chicago: ¾-inch to 6-inch black steel pipe, 78.35 per cent discount from list. From stock, jobbers' discounts are 76½ to 77 per cent.

Boiler Tubes.—Current demand is of good volume. Specifications are free and prices are firm. We quote carload lots, Chicago delivery, as follows:

	Steel.	Iron.	Seamless.
1 to 1½ inches	40.35	37.35	53.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	
Up to 4½ inches			50.50
6 to 13 inches	52.35	37.35	

Less than carload lots, from store, as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

Wire Products.—An advance of $1 a ton in wire nails, barbed and smooth wire, staples, etc., went into effect Monday, Jan. 8. No cessation is noted in the volume of business which continues to exceed the capacity of mills. We have revised our prices, and quote carload lots to jobbers, Chicago delivery, as follows: Wire nails, $2; painted barbed wire, $2.15c; galvanized barb wire, $2.45; smooth annealed wire, $1.85; smooth galvanized wire, $2.15; polished staples, $2.15; galvanized staples, $2.40. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher.

Coke.—Prices continue somewhat irregular, though demand is improving. For Connellsville 72-hour grades on contract, $3.50 ovens is asked, or $6.15 Chicago, but for spot delivery this quotation is frequently bettered, according to the anxiety of the seller to dispose of his stock. By-product coke is scarce and firm, and while it is usually offered on the same basis as Connellsville, the sold-up condition of western ovens enables sellers to get as high as $6.40 Chicago for what little tonnage is left.

Old Material.—No change is noted in the local market. Demand is light and prices remain soft. The Pittsburg market for the time being has practically ceased to be a buyer of western scrap owing to the large tonnage that was shipped there during the recent buying movement which satisfies all present needs. Railroads are accumulating scrap rapidly and throwing large tonnages on the local market. It is not being taken up, however, quite as quickly as previous lots, and one railroad—the Chicago & Northwestern—withdrew its list because of the low prices offered. Since that time two new lists—one for 3,000 tons from the Santa Fe, and another for 1,000 tons from the Chicago, Rock Island & Pacific, have been placed on the market, but have not yet been absorbed. Prices are without material change because of the lack of

trading, but it is not denied they could be made to meet the reasonable wishes of any active buyer. Our quotations are as follows, gross tons being given in the first paragraph:

Old Steel Rails (4 feet and over)	$17.25 to 17.75
Old Steel Rails (less than 4 feet)	16.00 to 16.50
Old Car Wheels	19.00 to 19.50
Old Iron Rails	23.00 to 23.50
Relaying Rails, subject to inspection	26.50 to 27.00
Heavy Melting Steel	15.00 to 15.50
Mixed Country Steel	12.50 to 13.00
For net tons we quote as follows:	
No. 1 R. R. Wrought	$17.75 to 18.25
No. 2 R. R. Wrought	17.25 to 17.75
Shafting	18.00 to 18.50
Dealers' Forge No. 1	14.50 to 15.00
Wrought Pipe and Flues	12.50 to 13.00
No. 1 Cast, 150 pounds and less	14.50 to 15.00
No. 1 Mill	9.50 to 10.00
No. 1 Busheling	12.50 to 13.00
No. 2 Busheling	12.25 to 12.75
Country Sheet	8.50 to 9.00
No. 1 Boilers Cut	12.50 to 13.00
Boiler Punchings	15.00 to 15.50
Iron Car Axles	24.00 to 24.50
Steel Car Axles	20.00 to 21.00
Iron Axle Turnings	11.50 to 12.00
Cast Borings	10.00 to 10.50
Mixed Borings, etc	10.00 to 10.50
Machine Shop Turnings	11.75 to 12.25
Railroad Malleable	15.00 to 15.50
Agricultural Malleable	14.00 to 14.50
Stove Plate and Light Cast Scrap	12.00 to 12.50
Old Iron Splice Bars	20.00 to 20.50

CLEVELAND.

Pipe Interests Buy a Large Tonnage—Foundries Not Buying Far in Advance.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, January 10.

Pig Iron.—The period of renewed activity which opened sharply with the new year did not spend its force with the filling of the heavy requirements reported last week, but is continuing with a good number of inquiries and no prospect of a let-up anywhere in the immediate future. The inquiries aggregating nearly 30,000 tons for pipe and foundry purposes which were current in this district last week have practically all been filled at prices near market quotations. Local interests will furnish this iron, which includes both northern and southern brands and is to be delivered through the first quarter. The continued demands of foundrymen for immediate shipments indicate that they are melting more heavily than ever before and are constantly running short on iron. While insistent on securing an immediate supply, however, they are buying only to cover their wants for the near future and manifest little alarm at the prospect of prices reaching a higher level. Inquiries which developed during the week aggregate several thousand tons, the demand being particularly strong for basic, with malleable and foundry brands also much sought. An occasional inquiry is for delivery through the year but the buying is principally to fill out low contracts. This alone is heavy enough to keep the market thoroughly active with continued business of this sort in sight for some time to come. Prices continue stationary. Southern iron is selling in good quantities at $14.50 for No. 2 and little can be secured below this figure. Coke is weaker than at any time since the advance began. A small lot of furnace coke sold during the week at $2.60 spot delivery and good foundry grades are obtainable at $3.50. The advent of severe winter weather is expected to prove a strengthening factor. We quote f. o. b. as follows:

Bessemer	$18.35
No. 1 Foundry	18.50 to 19.00
No. 2 Foundry	18.00 to 18.30
No. 3 Foundry	17.50 to 18.05
No. 2 Southern	17.85 to 18.35
Gray Forge	16.85 to 17.35
Gray Forge, Southern	15.85 to 16.35
Lake Superior charcoal	19.00 to 19.50

Finished Materials.—The feature of the week in these lines has been the advance in sheets of 0.05c on blue annealed. No. 16 gauge and heavier and 0.10c on black sheets. Structural materials are naturally in lighter demand as the result of winter weather putting an end to extensive building operations. The outlook in this line for spring building is unusually heavy, however, and mills are preparing for a record season. Orders for bar iron are being sought by certain mills, while others are sold far ahead and are out of the market. Prices vary from 1.85c to 2c with an occasional quotation lower than the former figure. Steel bars continue strong and light rails are in good demand at quotations recently advanced and considerable premium business. Plates are more or less erratic with some small plants of limited output seeking orders and some independent mills securing premiums for immediate shipments.

Old Materials.—Trading has not yet fully recovered from the holiday season and there is little activity in this line. Where mills are buying it is only for immediate requirements. A number of bar iron makers are not covered for contracts now on hand, but they are manifesting little alarm. Prices continue as for some weeks past with slight shading on small lots here and there. Bids at top quotations on certain items of a recent railway list failed to secure the lot, however, and dealers declare that a heavy snow will bring a sharp advance. We quote Cleveland delivery as follows:

Old Iron rails	$25.00 to 26.00
Old steel rails (over 6 feet)	16.75 to 17.75
Old steel rails (under 6 feet)	17.00 to 18.00
Old car wheels	17.00 to 17.50
Steel boiler plate	14.00 to 15.00
Steel axles	21.00 to 22.00
Malleable iron (railroad)	16.50 to 17.50
Malleable iron (agricultural)	15.50 to 16.50
Heavy steel	17.00 to 17.50
We quote as follows, net tons:	
No. 1 R. R. wrought	17.50 to 18.00
No. 1 busheling	15.00 to 15.50
No. 1 machine cast	13.75 to 14.25
Iron axles	23.00 to 24.00
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	9.50 to 10.00
Pipes and flues	13.50 to 14.50
Tank iron	11.00 to 11.50
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	10.50 to 11.00
Cast borings	8.50 to 9.50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST. January 9.

Total Sales of Pig Iron Exceed 100,000 Tons—Prices Shading Slightly Upward.

Pig Iron.—With a superficial appearance of quiet the market has been far from inactive. Fully 100,000 tons of all grades were placed in the east and prices are again tending slightly upward. Steel irons made up the bulk of the transactions, the total given including from 60,000 to 65,000 tons of basic and from 15,000 to 20,000 tons of Bessemer and low phosphorus grades. The United States Steel Corporation purchased 48,000 tons of standard basic pig iron for delivery at the Pencoyd works during the first half of the year. Foundry iron transactions have been limited to moderate sized lots, but the total sales of this grade and forge foot up to between 15,000 and 20,000 tons. Pipe founders and machine builders have been the chief purchasers. Although the increase scarcely warrants a change in quotations, still prices are distinctly on the up grade. Several furnaces have advanced demands 25 cents a ton. A fact significant of the extremely satisfactory condition of the pig iron market is that buying for delivery during the latter half of the year has already begun. Pipe works continue to be interested in the requirements of the New York Water Supply Department. A contract for between 30,000 and 40,000 tons of cast iron pipe was during the week awarded to a founder of Philadelphia; bids for about 30,000 tons more will be called for in the near

future. The scarcity of manganese iron continues and prices are almost anything the dealer fortunate enough to have any for sale is disposed to ask. Quotations give only a very inadequate idea of actual value or figures.

The following are prices at tidewater:

Northern No. 1 Foundry	$18.75 to 19.50
No. 2 Foundry	18.00 to 18.75
No. 2 Plain	17.50 to 18.00
No. 1 Southern Foundry	18.75
No. 2 Southern Foundry	18.25
No. 3 Southern Foundry	17.25 to 18.00
No. 4 Foundry	17.00 to 17.25

Pig Iron Certificates.—Trading in warrants and certificates on the New York Produce Exchange has not been active. There is apparently little metal of desirable grades to be had. The week has been dull and featureless, few sales and few changes in prices being made. Today there were sales of 100 tons of January, regular, at $16.50, and 100 tons of foundry, February, at $16.90. Foundry grades showed some firmness. Foundry iron warrants follow:

	Bid.	Asked.
January	16.65	17.10
February	16.90	17.00
March	16.75	17.10
April	17.00	....
May	16.85	....
June	16.85	....

Finished Iron and Steel.—Although the demand for structural material and rails continues active, interest has during the week been transferred largely to the lighter shapes. An advance in the price of sheets and tin plates was announced today and the question of an advance in plates will not down. The demand for plates has been extremely active in the local market during the week and premiums of $2 and $5 above the official figures are freely asked and granted. The more recent inquiries were for boiler and tank work, the structural needs having been for the time being supplied. New business in structurals has been chiefly confined to small lots, none of the big requirements of the vicinity having been placed. The Virginia Tidewater awarded a contract for 5,000 tons of material which seems to be the largest single tonnage provided for during the first five days of the new year. The terminal of the New York Central Railroad will require a considerable quantity of steel, but the contract has not yet been awarded. The strike of the housesmiths appears to have little or no influence upon those most interested, construction going on with only an occasional interruption and the demand for material being as urgent as ever. Sales of rails have been comparatively light up-to-date, but a number of large tonnages are still pending. Transactions closed during the week include 5,000 tons additional to the Wabash, 21,000 to the M. K. & T., and 3,000 additional to the Chesapeake & Ohio.

The following are prices at tidewater: Angles, 3 to 6 inches x ¼ inch and heavier, 1.84c; beams, 3 to 15 inches, 1.84½c; tees, 3 x ¼ inch and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary fire box, 1.94½c; refined iron bars, 1.84½c; soft steel bars, 1.64½c to 1.79c; black, 2.40c.

Old Material.—No new features have developed during the week, actual business continuing to be light. Inquiry in all grades is active, but there is no accompanying disposition to buy. The general opinion is that prices will not go lower and that they may go higher. The yards are carrying a fair stock of heavy steel scrap, but the supply of cast scrap is not large, the demand from local foundries being steady and about equal to the supply. Sales of wrought railroad scrap amounting to 500 tons are reported.

Old iron rails	$21.00 to 22.00
Old steel rails, long lengths	15.50 to 16.00
Old steel rails, short pieces	16.50 to 17.00
Relaying rails	23.00 to 24.00
Old car wheels	17.00 to 17.50
Old iron car axles	24.00 to 25.00
Old steel car axles	19.00 to 19.50
Heavy melting steel scrap	18.50 to 18.00
No. 1 railroad wrought scrap	20.00 to 21.00
Iron track scrap	18.50 to 19.50
Wrought pipe	14.00 to 15.00
Cast borings	10.00 to 10.25
Wrought turnings	14.50 to 15.50

PHILADELPHIA.

Business of the First Week of the New Year Highly Satisfactory—Heavy Orders.

From every standpoint, except possibly that of speculative dealers in old material, nothing could be more satisfactory than the first week of the new year. It has started off with a vim and snap greater than expected, and from every indication 1906 is going to be a greater record-breaker than 1905. The orders for finished material already placed may fairly be described as phenomenal.

Pig Iron.—The confident and buoyant tone noted last week continues undiminished, with ample grounds for its justification. Not only have a fair number of new orders been given, but there is a steady volume of renewals that is rapidly filling up the order books for the first half of the year. Beyond that there is a pretty general disinclination to go just at present. Sales of basic iron continue very large, and it is reported that not less than 75,000 tons have been sold in eastern markets in the last ten days. Low phosphorus has also been in great demand, even at as high a price as $25.50, but there is practically none to be had. Among the large contracts placed during the week is one for 33,000 tons of cast iron for New York's new high pressure fire service, which comes to a Philadelphia firm of pipe founders. The estimated value of this is $981,750. A Delaware river ship building firm has booked a $1,000,000 contract for a new steamship, and the American Bridge Co. has taken some very large bridge contracts for its Pencoyd plant. These have necessitated large additional purchases of basic iron which have been ordered from eastern furnaces. There are only specimen illustrations of the rush of business with which the new year starts. The weather has continued favorable, adding another bullish factor to the situation. Notwithstanding all these elements working for higher prices there has been no radical change, though the tendency is all upward. If the present enormous demand continues through the month there can be little doubt that prices will advance materially. For the present they may be quoted as follows:

No 1X Foundry	$19.00 to 19.50
No. 2X Foundry	18.50 to 18.75
No. 2 Plain	18.00 to 18.25
Standard Gray Forge	16.50 to 17.00
Basic	18.00 to 18.25
Low Phosphorus	24.50 to 25.00
Southern No. 2X, rail	18.75 to 19.00

Finished Material.—What has been said of the pig iron situation applies in large measure to the mills. Their volume of business is tremendous, and they cannot well be much busier than they are. Premiums must be paid for anything like prompt delivery, but the schedule prices remain unchanged as follows: Beams, channels and angles according to specifications, 1.82½c to 2.50c; refined iron bars, 1.75c to 1.85c; steel bars, 1.63½c to 1.83c; plates, 1.73½c to 1.83½c.

Old Material.—Temporary embargos placed by the railroad on Coatesville and Conshohocken, two of the largest consuming points for local scrap, and generally pleasant weather, have led to continued quiet in the market for old material. A more active demand is looked for before long, but for the present prices, which show little change, may be quoted as follows:

Old steel rails	$18.25 to 18.50
No. 1 steel scrap	18.00 to 18.50
Old steel axles	21.50 to 22.00

Old iron axles	28.00 to 28.50
Old iron rails	23.00 to 24.00
Old car wheels	17.50 to 18.00
Choice scrap, R. R. No. 1 wrought	21.50 to 22.50
No. 1 yard scrap	20.00 to 21.00
Machinery scrap	16.00 to 16.50
Low phosphorus scrap	23.00 to 24.00
Wrought iron pipe	16.50 to 17.00
No. 1 forge fire scrap	16.50 to 17.00
No. 2 forge fire scrap, ordinary	13.25 to 13.70
Wrought turnings	14.50 to 15.00
Axle turnings, heavy	15.50 to 16.00
Cast borings	10.50 to 11.25
Stove plates	13.50 to 14.00

CINCINNATI.

More Life in Pig Iron Market, Which is Strong—Many Melters Not Fully Covered.

January 9, 1906.

Pig Iron.—The market has exhibited more animation the past week, the leading item of interest being the purchase of a northern Ohio interest of 22,500 tons for first four months delivery, 14,000 tons of which was northern and 8,500 tons southern. The southern iron sold mainly at $14.00 Birmingham for No. 2 foundry and on the northern iron $17.50 at furnace was said to have been slightly shaded. The leading cast iron pipe interests bought some miscellaneous lots, and it is reported that in the aggregate the purchases amounted to from five to ten thousand tons. One lot of gray forge in this purchase went at $12.75 Birmingham. An important car building interest took a few thousand tons of assorted grades at $14.50 Birmingham for No. 2 foundry for delivery in Michigan. Some sales of malleable in moderate quantities have been made by Ohio furnace interests at $17.50 furnace. A northern Ohio concern bought about 8,000 tons of Bessemer and basic iron, but no prices were made public. There is an inquiry from Chicago territory for 5,000 tons of basic iron for midsummer delivery. The general inquiry for smaller tonnages is better and indicates that consumers are not all covered for first quarter, and that many have consumed more iron than they anticipated. The inquiry now pending and the sales of the week give an encouraged feeling to the selling interests and the market looks stronger than for some time. It is reported, however, that when the large purchase of more than 22,000 tons was under way, the buyer had the choice of many brands, indicating that there are ample offerings for present needs, and that current demand is being met without difficulty. The level of prices on all grades remains unchanged. Selling agencies report most of the inquiries for first quarter delivery which by some is taken as an indication that buyers will be inclined to cover only for their next few months' requirements and not anticipate their wants for the second quarter at this time. While the offerings are ample to meet the present inquiry a number of furnace interests report their order books filled for the first half of the year.

Southern Foundry No. 1	$17.25 to 17.75
Southern Foundry No. 2	16.75 to 17.25
Southern Foundry No. 3	16.25 to 16.75
Southern Foundry No. 4	15.75 to 16.25
Southern Foundry No. 1, soft	17.25 to 17.75
Southern Foundry No. 2, soft	16.75 to 17.25
Gray Forge	15.75 to 16.00
Northern Foundry No. 1	19.15 to 19.65
Northern Foundry No. 2	18.65 to 19.15
Northern Foundry No. 3	18.15 to 18.65
Jackson County Silvery, 8 percent	20.15 to 20.65
Southern Charcoal	19.75 to 20.25

BIRMINGHAM.

Strong Inquiry and Conditions Generally Favorable—Much Talk about Mergers.

Birmingham, Ala., Jan. 8.—The Alabama iron manufacturers begin the new year with a strong inquiry and a fairly good demand. A few sales were made during the first week of the year for delivery during the first six months. It is announced that the indications all point to a steady market for the first half of the year at least and there is confidence that the last half of the year will be most satisfactory. Iron quotations are firm at $14.50 per ton, No. 2 foundry. There will hardly be any advance in prices for some little time, unless the demand should pick up more than is expected.

Furnaces which have been banked since the beginning of the holiday season two and three weeks back have resumed operations again, the Tennessee Coal, Iron & Railroad Co. alone blowing in two furnaces, one at Oxmoor and one at Bessemer. The Tennessee Company will blow in its Alice furnace in the city about the 15th inst.

The production in this district is to be kept up. Despite the extremely inclement weather now being felt the supply of raw material is holding up well.

The following iron quotations are given: No. 1 foundry, $15; No. 2 foundry, $14.50; No. 3 foundry, $14.; No. 4 foundry, $13.50; gray forge, $12.50 to $13; No. 1 soft, $15; No. 2 soft, $14.50.

The steel production in Alabama is again booming, especially is the Ensley plant of the Tennessee Company doing well. Some records are being broken at the various departments at this plant.

Rolling mill circles in Alabama are most happy, the new year starting off under most favorable conditions. The Republic Iron & Steel Co. will resume operations in the new puddling department shortly, the old puddling mill doing the work since the mills started up several weeks ago. It is given out that a number of rolling mill hands will be brought to this district from Pennsylvania and other states to take up work here, steady employment being assured for some time to come. It is reliably stated that there is a strong demand for finished iron and steel and the prospects for some to come are very bright.

Machine shops and foundries are all doing nicely considering the high prices prevailing for pig iron. There are some orders on hand which are giving steady employment to quite a number of men while other business is in sight.

Much gossip prevails in this district concerning the merger between the Tennessee and Republic Companies. That there is to be a change in management appears to be a certainty and while nothing definite can be learned here it is believed that the time is not far off when the new management will take hold of operations. There is talk now that the Alabama Consolidated Coal & Iron Co. and the Sloss-Sheffield Steel & Iron Co. may be parties to another merger in this district. The Alabama Consolidated has had a most successful period for the last year and a half. This is the only iron manufacturing company in the district recognizing the union coal miners.

During the past week two large coal companies were incorporated in this state, one with a capitalization of $325,000 and the other with a capitalization of $110,000. Both companies expect to open coal mines in the next few months.

Manganese Ore Purchase.—The Illinois Steel Co., Chicago, has again become a purchaser of domestic manganese ores. The high prices asked for imported ferromanganese and the practical impossibility of obtaining any, owing to the revolt in Russia, led to the renewal of negotiations with mining interests at Leadville, Colo., which resulted in an order being placed for 15,000 tons, to be shipped immediately. This is the first manganese ore the company has bought in this district in five years, the purchase being made possible by a reduction in the freight rates between that point and Chicago.

The Metal Market.

NEW YORK.

Pig Tin.—The local market has felt the effect of the unusual activity abroad and prices rule firm. Today's quotations follow: Spot, 36.15 to 36.30 and January, 36 to 36¼; February, 35.85 to 36¼; March, 35.80 to 36¼; London. £164 and £164 10s. Arrivals for the month to date, 680; afloat, 3,615.

Copper.—The market has been dull, consumers being apparently well covered and producers sold up for several months. Today's closings follow: Lake and electrolytic, 18¾ to 19; casting, 18⅜ to 18⅞; London's closing today: £79 10s and £79 5s. Exports for the month to date, 1,652 tons.

Lead.—The tone has been firm with fair sales and steady prices. Today's closings: 5.90 to 6.00; St. Louis, 6.00; London, £17 7s 6d.

Spelter.—There has been a fair demand for refined spelter and the market is fairly steady. Today's closings: 6.50 to 6.60; St. Louis. 6.45 to 6.50; London, £29 2s 6d.

Antimony.—The market has been quiet but firm: Today Cookson's and Hallett's were held at 14 to 14½c, and other grades, 13½ to 14c.

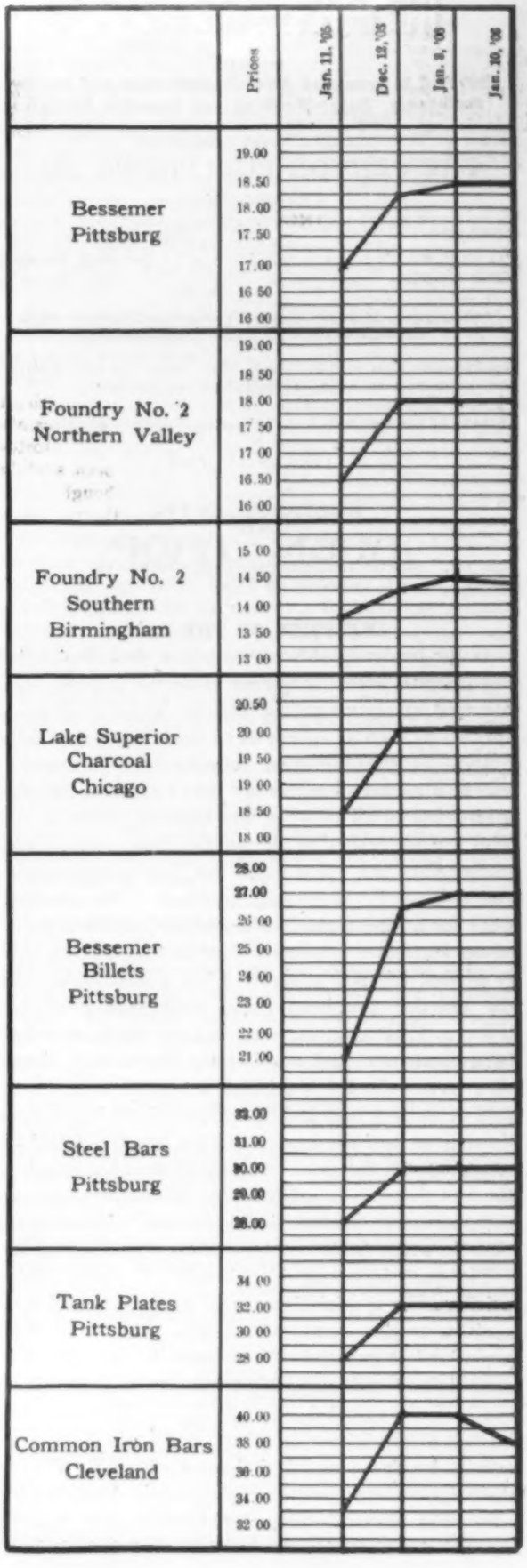
Record Breaking Job of Machine Work.—On Dec. 13, 1905, at 4 A. M., a large flywheel, built in the 70's by the Corliss Steam Engine Co., of Providence, R. I., in use on one of the mills at the Oliver Iron & Steel Co.'s plant, burst, breaking the shaft and pillow blocks. At 2 P. M. the same day, Mackintosh, Hemphill & Co., Pittsburg, were given the order for a new 54-ton, built up flywheel, 24 feet diameter, also new shaft and pillow blocks, all for quick delivery. The shaft, weighing fifteen tons, was forged by the Midvale Steel Co., Nicetown, Pa., and shipped with tracer traveling on the car. Three segments of the wheel were cast each day until completed, and the entire job was bored, turned, fitted, and the last shipment made on Dec. 28; the flywheel was cast, bored, fitted and turned in ten and one-half days after molding began on the first piece. The entire job was erected in place, and the mill started on the morning of January 2.

The Pennsylvania Steel Co., Philadelphia, has announced important changes in management. The offices of general manager, superintendent and assistant superintendent are abolished, and in their stead the offices of metallurgical engineer, vice president, general superintendent and assistant general suprintendent are created. H. H. Campbell, general manager becomes metallurgical engineer; J. V. W. Reynders, head of the bridge and construction department, goes to Steelton, Pa., as vice president; John W. Dougherty becomes general superintendent with F. B. Carney as his assistant and Thomas Earle as head of the bridge and construction department. The headquarters of President E. C. Felton remain at Philadelphia.

Launching of the Sellwood.—At the Lorain, O., plant of the American Shipbuilding Co., Jan. 6, the Joseph Sellwood, the second steamer building for Captain John Mitchell for 1906 by this company was launched. The boat is practically a duplicate of the Joseph G. Butler Jr., launched a few months ago at the same yards. She is 545 feet over all, 525 feet keel, 55 feet beam and 31 feet beam, with a carrying capacity of 10,000 tons. Capt. R. C. Jackson will be in command when she is completed.

The Bilboa Steel Co., Bilboa, Spain, it is stated, was awarded a recent steel rail contract in Vancouver, B. C., at $27 per ton delivered, a rate one dollar cheaper than that offered by either American or English companies.

PRICE CHART.



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INJUSTICE OF THE PASS.

If the tendency of some railroads, manifested during the past week, to recede from the positive stand assumed in regard to the further issuance of passes spreads to such an extent as to work a practical nullification of transportation reforms lately secured, it will be a matter of regret not only to railway managements, but to all those in the business world as well who are advocates of the square deal. For a good many years the "pass evil" has been a troublesome and constantly increasing problem. Its workings were for a time somewhat diminished by the activities of the Interstate Commerce Commission, but the power of that tribunal apparently has waned of late and the practice has been more widespread than ever before. Efforts at its restriction or eradication have been numerous and consistently ineffectual, though they have reflected a popular sentiment even on the part of railway men and oftentimes of the beneficiaries themselves, and the progress of the last few months in stamping out the practice owes its success largely to the fact that it is in accord with the country-wide crusade for fairer, squarer, industrial and business conditions in every field.

The pass is wrong in principle; it grants special privileges to special classes and hence is in strict opposition to our democratic ideals. The "free transportation" it grants is "free" only in the sense of a near-sighted economy; it's a purely business institution with the railroad. Somebody has to pay. It may be that the legislator or other official will balance his acount by throwing his influence where it will give the railway some priceless advantage; the little shipper,—who doesn't carry a pass—will help pay the fare of the big shipper who does and feels it in his pocket when he maps out the route of his freight; it may happen that the newspaper which finds transportation always ready will see fit to handle its account of a disastrous wreck so as to absolve the railway from criticism and damage claims. Anyhow, somebody pays and has been paying these many years, else the practice would have been discontinued long before it became so firmly rooted as to weather storm after storm of popular indignation.

The strict restriction of the pass to railway employes in the performance of their duties and its discontinuance to all others would work wonders for honest legislation and higher business morals. Recent events indicated that this had been accomplished; many railroads earnestly desire the reform; to weaken now would be to return more securely than ever before to a practice for which there is only condemnation.

THE FIGHT FOR FREE MEN.

Great interest is being manifested from San Francisco to New York in the strike which the printers have declared against the Typothetae, the organization of employers, for the eight hour work day and the closed shop. In New York city a few employers surrendered to the un-American closed shop demands before the strike was declared, thus showing lamentable weakness, and the employers against whom the strike was declared are now rapidly lining up for or against the principle of free men in printing establishments. The advocates of the open shops are showing a determination which is certain to result in the success of their attempt to free themselves from union domination. Employers everywhere who have had experience with labor troubles will admire the pluck of these New York employers who have refused to surrender the right to manage their own business.

The latest development in the way of union demands is in union-ridden San Francisco, where the typographical union has inaugurated a campaign for 40 hours a week, beginning with Jan. 1, 1907. That is, they propose to work only five days of eight hours each. This action of the San Francisco union furnishes new and important evidence of the necessity of opposing the present demands of the printers because it indicates that the eight hour day for six days would be only a step towards demands for still further reductions. The time to make the fight is now.

WASTED IRON AND STEEL PLANTS.

The *Bulletin* of the American Iron and Steel Association in its issue of Dec. 30, 1905, gives a list which is worthy of a little study and of considerable thought. The list is that of abandoned and dismantled plants. It shows that 16 of the plants which are now out of business have been built in the last five years. Why should so many modern plants fail in a period of great prosperity? In some cases it may have been, and un-

doubtedly was, due to bad management. In other cases the plants should never have been built at least not in the location chosen.

The main considerations involved in the choice of a location for an iron or steel plant are: Availability of ore, availability of fuel, the proximity of a market for the product and transportation facilities. If any one of these considerations is neglected, the plant is handicapped in its competition with other plants serving the same market.

An examination of the list reveals the fact that proper judgment was not used in many cases in locating the plant. One was in Connecticut, and although it was near a market it was a long distance from fuel and ore supplies, and was served by a single railroad system. Another plant was in the center of New York state, where the fuel and ore supply could be obtained only by long and expensive railroad haul. The market, too, was a long distance away. Three other plants in various points in Pennsylvania required a long rail haul for either their fuel or their ore, were all unfavorably located as regards a market, and two of the three were served by only one railroad system. And so on down the list.

These considerations do not, however, apply to all the new plants dismantled. Some of them are in the most favorable locations, and alongside plants which are and have been in successful operation for years. Bad management or lack of capital may have contributed to their failure. The latter is a potent force in the failure of many. It requires an enormous amount of money to erect a steel plant. It requires almost as much more to operate it, before there are any returns which will carry on the business. Many companies, composed of optimistic and perhaps inexperienced men, not realizing the tremendous outlay required, and seeing a large business done by the existing plants, put up a mill with insufficient and often bororwed capital. When the mill is completed the money to run it is lacking, and the usual course of bankruptcy, abandonment and dismantlement follows. The amount of capital wasted in these ventures is hard to calculate. The good that it would do, if diverted to other and more useful channels, can never be calculated; and to think of the wasted energy and disappointed hopes involved is appalling.

Sharon Steel Hoop Changes.—At the annual meeting of the Sharon Steel Hoop Co., Alfred N. Perkins, treasurer, and John R. Hastings, vice president, tendered their resignations. J. W. Tedford, secretary, was elected to succeed Mr. Hastings as vice president and A. O. Blackburn was elected treasurer to succeed Mr. Perkins. R. A. Winterburn was elected secretary to succeed Mr. Tedford.

Machinery Dealers' Association will be held at the Hotel The first annual meeting of the National Supply and Machinery Dealers Association will be held at the Hotel Chamberlain, Fortress Monroe, Va., on Feb. 14, 15, and 16. J. H. Drury of Cleveland is secretary of the association.

DEATH OF CHAS. S. GUTHRIE.

Charles S. Guthrie, chairman of the executive committee of the Republic Iron & Steel Co. and formerly president of the American Steel Hoop Co., was taken suddenly ill with appendicitis at his shooting place, Gibsonville, North Carolina, on Wednesday, Dec. 27, and removed to Stokes Hospital, Salisbury, N. C., where he was operated upon and almost immediately developed complications of septic poisoning and pneumonia. After a slight improvement, he grew worse and died Jan. 3. He was born in Zanesville, Ohio, and was in the forty-third year of his age.

Mr. Guthrie first became interested in the iron and steel business in Cincinnati where he was associated first with Geo. N. Gray and later with Matthew, Addy & Co., representing the sale of southern iron. He went to Pittsburg in 1890 with Naylor & Co., of New York, and in 1897 became a partner in that concern. He was also heavily interested in Banning, Cooper & Co., when that concern was organized. He later organized and was the first president of the American Steel Hoop Co., and when this concern sold to the United States Steel Corporation he retired, but his large interests as an investor and stockholder in the Republic Iron & Steel Co., and more recently in the Tennessee Coal, Iron & Railroad Co., gradually got him back into active business and last October he was elected chairman of the board of directors of the Republic Iron & Steel Co. He was one of a syndicate of Republic stockholders who recently obtained control of the Tennessee Coal, Iron & R. R. Co. He had a very accurate knowledge of the details of the business and a wide, comprehensive grasp of the iron industry. He was a special partner of the brokerage firm of Whitehouse & Company, 111 Broadway.

Mr. Guthrie was a governor in the Westminister Kennel Club and a member of the Union, Racquet, Tuxedo, Brook and Meadowbrook clubs and others both in this country and aboard. His residence in New York city was at No. 43 West Fifty-sixth street and he had a country place at New London, Conn.

ALABAMA CONSOLIDATED EARNINGS.

The Alabama Consolidated Coal & Iron Co., in its annual report for the year ending Oct. 31, shows gross earnings $3,555,644, operating expenses $2,996,183, net earnings $559,461, depreciation, state taxes, etc., $147,984, surplus $411,477, dividends $87,500 and net surplus $323,977. The earnings were the heaviest in years as were also the operating charges. The output of tonnage for the fiscal year was: iron 118,829; coal 642,230; coke 268,383. Total iron sales were $1,623,446.

President Bush, in reviewing conditions of the year, states that one of the best furnaces of the company was out of blast four months. New coke ovens contracted for, 100 at the Lewisburg mines near Birmingham and 50 at the Searles mines, will give the company 915 ovens with an annual capacity of 325,000 to 340,000 tons. Its four furnaces have a capacity of 200,000 tons of iron per annum. The company sets aside 25c per ton on all iron made as a reserve fund for repairs on the furnaces.

Shenango Plant to Operate.—The plant of the Shenango Iron & Steel Co., at Wheatland, Pa., will be partly in operation by the latter part of this month. By that time it is expected the manufacture of muck bar will be under way, although the remainder of the plant, for the manufacture of bar iron and skelp, will not be ready for operation before the middle or latter part of February. The officers of the company are: John C. Bole, president; Henry A. Ross, vice president and secretary and Andrew W. Herron, treasurer. William S. Roberts is superintendent of the plant.

BRITAIN'S PHENOMENAL YEAR.

Conditions Approaching Dullness Marked Opening Month —Causes of the Heavy Demand.

(Special Correspondence.)

Birmingham, Eng., Dec. 30.—The year just ended will be memorable in the annals of the British iron trade as a period of surprises, as well as of remarkable revival. If some far-seeing prophet a year ago had predicted the prices now prevailing he would have been laughed to scorn. Here are some samples of the advances that have taken place. Northamptonshire pig, which in January last sold for £2 2s 6d, is now yielding £3. Derbyshire iron has advanced 15s, marked bars have been raised from £8 to £8 10s, and unmarked bars from £5 15s to £7 5s. Sheets (doubles), which then realized £6 15s, now readily find customers at £8 5s to £8 10s. Staffordshire cinder forge, which stood at £2 3s 6d, is now £2 16s 6d, and galvanized sheets, formerly £10 10s, are now £12 10s.

It cannot be said that there were a year ago no signs of revival, but the slight increase of animation was almost wholly restricted to pig iron, of which larger quantities had been sold, and this was believed to be entirely due to American speculation, producing hardly any effect upon the price of finished iron, which was still a drug in the market. Steel, however, was even then showing some activity, and there were forward bookings. This condition of things passed away almost wholly, and business was, with some few exceptions languid in the early part of the year. The first impetus seems to have come from ship building, and was very much assisted by some very substantial orders for battleships, given out by the government in the early spring. Even before the close of the war, the eastern trade began materially to revive, and the peace settlement was followed by a decided upward movement. Apparently, the turn of the tide found everybody short of supplies. Railways hastened to place their locomotive orders, and contracts for railway wagons were closed literally by the thousand. Various municipalities with large enterprises pending realized that the psychological moment had come, and orders were forwarded for tram cars and rails, water and gas pipes, etc., in large quantities. Ship owners rushed to the Clyde and Tyne with orders for new vessels, and even the farmers, stimulated by a good harvest, laid in a stock of iron to roof their premises and fence their fields. Merchants' stocks were altogether abnormally deficient, and big orders were placed by dealers whose buying for years had been of the hand-to-mouth description. The result is that at the present moment every forge, mill, and foundry is working at high pressure, and forward bookings are so substantial that a prosperous year would seem to be already absolutely assured. A large number of works are being extended, blast furnaces enlarged to secure a heavier daily tonnage, and in most cases additional mill furnaces and puddling furnaces are being built. British ironmasters are at present enjoying the rare luxury of carrying on their industry practically without foreign competition. This, however, brings with it certain disadvantages, as German billets are being rather sorely missed, and a few heavy consignments would be welcome. The scarcity of pig iron will be a source of trouble in the new year, and further advances may be regarded as a certainty. The political crisis, so far from impeding business, seems rather to have given an additional fillip, inasmuch as it guarantees for some time at least the maintenance of the existing order of things in regard to free trade. The most unexpected feature, referred to in previous letters, is the restoration of puddling as the result of a scarcity of steel, and a reaction in favor of the older metal. The improvement has been assisted to some extent by the extensive dismantling of old iron works, especially in the sheet line, which has restricted the area of production, and prevented speculators from taking advantage of an old plant to rush in and reap a harvest during the period of high prices. At the present time, manufacturers hold a commanding position, but profits are kept down by the still serious proportion of old contracts not yet disposed of. Generally the outlook for 1906 is as bright as could be wished.

Cement Users' Convention.—The second convention of of the National Association of Cement Users opened at the West Side Turners' Hall, Milwaukee, Wis., Tuesday, Jan. 9, with an exceedingly large and representative attendance. Despite the confusing changes in the convention plans, the exhibits of cement blocks, reinforcing systems and materials, water-proofing, builders' and concrete supplies, concrete block machines and various other machinery covered several thousand feet of floor space. The program included a variety of papers covering the wide field which the association serves. Special sections, each in charge of a vice president, heard additional papers and reports covering the narrower fields of their activities. The officers of the association are: Richard L. Humphrey, Philadelphia, Pa., president; Merrill Watson, New York, first vice president; J. H. Fellows, Scranton, Pa., second vice president; H. C. Quinn, Dublin, Ga., third vice president; A. Moensted, Milwaukee, Wis., fourth vice president; Charles Carroll Brown, Indianapolis, Ind., secretary; and A. S. J. Gammon, Norfolk, Va., treasurer.

Officers Nominated.—The annual meeting of the New England Foundrymen's Association was held Jan. 10 at its rooms in the Exchange Club, Boston, an unusually large attendance honoring the tenth anniversary of the association's founding. The nominations of officers for the ensuing year reported to the association were: President, Walter B. Snow of the B. F. Sturtevant Co.; vice president, Wm. H. Bense, Kinsley Iron & Machinery Co.; treasurer, George H. Lincoln of George H. Lincoln & Co.; secretary, Fred F. Stockwell of Barbour & Stockwell; executive committee (five to be chosen,) H. F. Arnold of the American Tool & Machine Co., H. A. Carpenter of A. Carpenter & Sons' Fdy. Co., C. J. Caley, of the Russell & Erwin Mfg. Co., Arthur Gibby of the Mechanics' Iron Fdy., A. J. Miller of the Whitehead Bros. Co., Henry Souther of the Souther Eng. Co., and H. E. Wetherbee of the James Hunter Machine Co.

A New Lorain Company.—The American Steel & Tube Co., with a capitalization of $100,000 has been organized by a number of the most active and heavily interested officers of the American Shovel & Stamping Co., Lorain, O. Adjacent to the latter's works and for operation in conjunction with its plant, the new company is installing a "combination mill," the layout of which is unique in that its adaptability makes it susceptible of wide expansion. Its product will consist of sheet bars, sheets No. 18 to No. 10 inclusive, slabs, plates No. 9 to ¼ in. of special analysis including high carbon for agricultural implement parts and shapes, skelp, tack and nail plate of various widths, tubing, butt nonwelded for agricultural implement and bedstead manufacture, tie plates and muck bars of various standard widths; the annual capacity will be from 50,000 to 75,000 tons. After the completion of the present plant, it is the intention to add a strictly modern 12-in. guide mill for the manufacture of finished bars and angles to a capacity of 20,000 to 30,000 tons annually. The brand of all these products will be the "Veribest."

PERSONAL.

W. G. Henderson, district sales agent, will give up the agency of the Lackawanna Steel Co., at Cleveland, Feb. 1. and will be succeeded by Major C. D. Rhodes, formerly general sales agent of the company. The office is at 301 Citizens' Bldg.

Winter Rose, for some time assistant master mechanic of the blast furnace department of the National Tube Co. at Lorain, O., became master mechanic Jan. 1, succeeding James Mitchell who recently resigned.

W. H. Welch has established an office at 716 Williamson Bldg., Cleveland, for the sale of high grade machine tools and metal working machinery for all manufacturing purposes.

C. W. Carpenter of Boston has taken the presidency of the Herring-Hall-Marvin Safe Co., succeeding R. T. Pullen, recently resigned.

Henry E. Sherlock has been advanced to the presidency of the Novelty Iron Co., Canton, O. He succeeds William E. Sherlock, who was one of the organizers of the company in 1882, and has been president and active in the management.

George Heffner, an experienced furnace man from Pittsburg, is superintendent of the Genesee blast furnace of Corrigan, McKinney & Co., just blown in at Charlotte, N. Y., after a four months' shut down for repairs so extensive as practically to amount to reconstruction.

J. Garry Phelps and George M. Zelner have formed a partnership under the name of Phelps & Zelner to handle iron and machinists' supplies. Their office is located in the Fourth National Bank Building, Grand Rapids, Mich.

David Z. Norton of Cleveland, member of the firm of Oglebay, Norton & Co., is to be honored by having his name given to the steamship building at the Cleveland yard of the American Shipbuilding Co. for Capt.. W. C. Richardson.

H. L. Shock, late vice president and general manager of the Empire Portland Cement Co., Warners, N. Y., has been appointed manager of the cement department of the Struthers Furnace Co., Cleveland, with plant at Struthers, O. He has had a very wide experience as a manufacturer of Portland cement.

C. B. Richards, formerly with the Acme Machinery Co., the Cleveland Pneumatic Tool Co. and more recently with the Canadian Machinery Co., has associated himself with the Cleveland office of Dravo, Doyle & Co., New England Bldg.

Harry Fisher, who has been superintendent of the Buffalo Foundry Co.'s foundry at Buffalo, N. Y., for the past two years, has resigned and accepted a position as superintendent of the Bass Foundry & Machine Co., of Fort Wayne, Ind., where he succeeds T. R. Pickard, who has been connected with the Bass Co. for 51 years.

President W. G. Mather, of the Cleveland Cliffs Iron Co., Cleveland, and vice president J. C. Holt, of the Superior Charcoal Iron Co., Grand Rapids, Mich., will sail for Europe Jan. 20.

A. M. Fowler has accepted the position of superintendent of the Vulcan Iron Works, San Francisco, Cal.

Frederick A. Waldron, Stamford, Conn., has accepted the position of works engineer with the National Cash Register Co., of Dayton, O., having given up his engineering business and severing his connection with the Yale & Towne Mfg. Co.

M. Cochrane Armour, president of the Iroquois Furnace Co., Chicago, and resident partner in that city of Rogers, Brown & Co., will sail Feb. 27 on the steamer Caronia for a cruise in the Mediterranean Sea. Mr. Armour will be absent about four months, his intention being to supplement the cruise with a trip that will take in the leading cities and points of interest in Europe. He will be accompanied by his family.

W. E. Clow, vice president of James B. Clow & Sons, Chicago, left last week for Cuba, where he will remain for the next three weeks.

Thomas S. Hanna has associated himself with the Baldwin Steel Co., 107 John street, New York. He was formerly with the Colonial Steel Co., of Pittsburg.

OBITUARIES.

John W. Paxson, founder of the J. W. Paxson Co., Philadelphia, in 1855, died Jan. 3 at the age of 87.

Jacob Fisher, aged 33, night superintendent at the Ohio Steel Works of the Carnegie Steel Co. at Youngstown, O., died Jan. 4 of pneumonia.

John H. Cooper of Braddock, Pa., died at the West Penn hospital, Pittsburg, Jan. 3 after an illness of several weeks. He was 63 years of age. For many years he was head bookkeeper of the Edgar Thomson Works, but ill health recently forced his retirement. One of his sons, Samuel Cooper, is general manager of the American Sheet & Tin Plate Co.'s plant at McKeesport, Pa., where John Cooper, another son, is superintendent.

John M. Baker of Sheridan, Pa., died Jan. 3 from general debility resulting from a sunstroke suffered years ago. Up to the time of his retirement fifteen years ago he was master mechanic for the Jones & Laughlin Steel Co. He was born in England and was 79 years old.

Frederick M. Helfrich, a building contractor in Braddock, Pa, died Jan. 4 after a long illness. He worked on the rolls of the first rail mill of the Edgar Thomson works.

James A. Mercer, aged 76 years, died at Pittsburg, Jan 4. He was well-known among the older mill men, having at one time held the position of night manager at the Schoenberger mills, now a part of the American Steel & Wire Co.

Fred W. Reeder Sr., one of the oldest blast furnace workers in the Mahoning valley died at his home in Youngstown, O., last week, age 81 years. He has been retired for the past 14 years.

Robert R. Stannard, president of the Blake & Johnson Mfg. Co., Waterbury, Conn., a well known machinery manufacturing concern, died suddenly at his home Jan. 4 of cerebral hemorrhage. He was born in 1847.

Col. Eugene E. McLean, engineer of the Department of Finance of New York, died March 5 at his home on west Fifty-seventh street. He had spent half a century in the employ of the city.

Peter N. Burke, inventor of the Burke range and for many years engaged in the stove manufacturing business in Albany, N. Y., died recently at his home in New York City.

John Dougherty, general manager of the Colorado Coal & Iron Co., and president of the New York Continental Jewell Filtration Co., died in the New York Hospital Dec. 28, at the age of 65 years. During his career he held responsible positions with the Pennsylvania Railroad Co., the Denver & Rio Grande railroad, the Mexican National railroad and the Buffalo, New York & Philadelphia railroad.

Frederick A. Griffin, assistant superintendent of the Empire Iron & Steel Co., Reading, Pa., died Dec. 20, at the age of 31 years.

J. H. Hills, superintendent of the Haydenville Brass Works, Haydenville, Mass., died Dec. 24, aged 50 years. Mr. Hills was born in Haydenville, and had lived there nearly all his life.

IMPORTANT CHANGES

In Personnel of Mining Companies to be Announced—Great Activity in Winter Operations.

Duluth, Jan. 7.—Winter operations proceed with great rapidity and without friction. Weather remains warm. Stripping is carried on successfully and economically at many mines, and at others the underground operations are without a hitch. If the great predictions for 1906 are to be fulfilled, not only the Mesabi but all ranges will have to hustle. Important changes in the personnel of leading operating officials of the Oliver Iron Mining Co. will soon be announced here, one of them especially significant from its bearing on other mineral interests. There is a great deal of talk of new exploration at various points. Much of the newspaper news is, however, of the class that is "important if true," but has no claim of relationship with facts. The Vermillion range is receiving unusual attention; many drills are on the Menominee, the west and east ends of the Gogebic are each receiving attention; the Cuyuna district has its full share, and a great deal of work is in progress on the western Mesabi. It is thought that the Gunflint country will be attacked in due time, while the magnetic position of the Mesabi, east of Mesaba station, is under renewed discussion.

The Oliver Company has bought a 250 kw. generator for electric underground haulage at the Sibley mine, which is one of its important Ely mines on the Vermillion range.

Newspaper reports are that Pickands, Mather & Co. have bought the small ore body on section 30-59-14, Mesabi range, owned by Messrs. Kinney, Hawkins, et al., but no such deal has been made. This firm mined last year 1,903,000 tons of ore, including half of the product of the Cypress, an increase of 700,000 tons over 1904. They are developing several new mines and exploring actively. On the eastern Mesabi they have a difficult development in the Syracuse and Bangor, and a very easy one in the Mohawk, which latter is now ready to ship. They are moving the Menominee range offices from Amasa to Iron Mountain and superintendent C. E. Lawrence is to have the word "general" added to his title. The Fogerty exploration at Iron river has been taken over and will be opened. It is an encouraging prospect.

Exploration on the Baraboo range is not proving satisfactory, and stories that the Cleveland Cliffs Iron Co. was to explore Warsau are denied officially.

A large area of mining ground has been added to the Mesabi city of Virginia. This includes the Sauntry mine on the north, and the Auburn, Great Western, Moose, Minnewas, Roucheleau and Shaw on the south and east. All these are idle. Every operating mine in the district proposed to be taken in voted to remain outside, namely Minorca, Higgins, Lincoln, Commodore, Franklin group and Union.

The Peteler Co., of Minneapolis, has a contract for 550 wood standard gauge dump cars for the Oliver Iron Mining Co. for early delivery. More may be bought later.

An incline shaft will be sunk at the Leonard Mine, at Hibbing. This mine has been booked to furnish 500,000 tons next season. Its pit is small for so large an output. Wm. Wearme, who has been superintendent, has resigned to take charge of the Winnifred.

A large part of the population at Clark mine location, at Hibbing, and at Adams, at Eveleth, must move at once, as the companies are to mine under their houses.

The Antoine Ore Co., Menominee range, will add a lot of machinery, including hoists and a 7½ Gates crusher. This will double the mine's capacity, and will enable it to mine up to 300,000 tons in a season of navigation and to crush it all, if need be, in that period. The mine is making a fine record, both for production and economy.

Construction work is progressing rapidly on the St. Paul ore dock at North Escanaba. About 130 men are employed. There is some delay in securing timber, much of it coming from the Pacific coast. Owing to an advance of prices this dock will cost 25 per cent more than No. 1.

TOPPING IN CHARGE

At the Pittsburg Office of the Republic Iron & Steel Co.—Will be Elected President Today.

Mr. John A. Topping, who on Jan. 1 resigned as president of the American Sheet & Tin Plate Co., has assumed active charge of the Republic Iron & Steel Co., and has established headquarters in the Pittsburg office of the company. The resignation of S. G. Cooper as president of the Republic Iron & Steel Co., has been tendered and at the meeting of the executive committee Jan. 11 it will be accepted and Mr. Topping will be elected president. He is now familiarizing himself with the duties of the position.

It has been understood by most of Mr. Cooper's friends that he went into the Republic Iron & Steel Co. at the earnest solicitation of members of the Republic board of directors, who hoped he would continue with the company, but pressure of other business interests were such that he gave them to understand he would act as president only until certain plans had been consummated, in fact, would become an interim president, personal interests preventing him from continuing permanently.

Mr. Topping, when seen at Pittsburg, said he was not prepared to give out any information as to the Republic organization. He said the change would necessitate some reorganization, but that the present working force would be retained.

Best Building Year in History.—Reports of the building operations in twenty-six of the principal cities of the country, collected by the *Construction News*, show an increase in the value of permits issued during December of 47 per cent as compared with corresponding month of 1904. The cost of buildings for which December permits were issued aggregates $31,333,050 as against $21,264,508 a year ago. The year just closed, the *Construction News* declares, has been "in every respect the most satisfactory that we have ever had. Building has gone on uninterruptedly in every city, town and village in the country, and there is every indication that it will continue for a long time to come."

The Willebrands Machinery Co., Detroit, has acquired the plant of the Detroit Cast Iron Brazing Co., and is adding a machine shop and other improvements, the aim being to provide adequate works for the business of brazing cast iron. The Pich process which the company uses makes possible the brazing of a piece of casting of any size in a few hours and the welded part is pronounced equal in strength and appearance to an unbroken part. The intention is to cater chiefly to rapid repairs on cast iron machinery where now patching has to be resorted to or delay undergone while the manufacturer provides a new part.

Correction of Ore Statistics.—Owing to the fact that one dock at Ashtabula was reported twice, the statistics of iron ore receipts and ore on dock at that port, published last week, were not correct. The receipts for the season 1905 were 6,373,779 tons at Ashtabula, and the ore on dock at that port Dec. 1 was 1,589,951. The total receipts at all ports were 28,479,056 tons and the ore on dock was 6,438,967.

AMONG NEW YORK MACHINERY MEN.

Great Activity in All Lines—Deliveries Still Far Behind Sales—Railroads Lead in Demand for Tools.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., January 9.

The outlook for business in all classes of machine tools is brighter at the beginning of 1906 than it has been for years. Although the past twelve months have been very satisfactory, especially during the latter half, manufacturers are looking forward with confidence to even greater prosperity in the year just begun. Many of the large railroads are planning extensive purchases for the current year, and the many new shops in all lines of industry and additions to older buildings which have been under construction for the past month or two will all need equipment. A great deal of the new requirement for this purpose has already been placed, but there is still a large proportion to be purchased. The question of securing timely delivery of goods is as serious as ever. Indeed, one selling agent remarked that it was far more difficult to secure delivery from the manufacturers than to sell goods. The demand for power units and transmission material from the south and west gives some indication of the wide extent of the epidemic of new factory construction which has seized the country since last summer. An unusually brisk inquiry for small drill presses and the simpler machines, shows that the activity is not confined to large masses only.

As is the case also in the steel trade, the railroads lead the procession. The enterprises of great magnitude now under way, public works, tunnel construction and the building of new tracks, new rolling stock and new power equipment in which the railroads which enter into New York are now engaged all involve considerable expenditures for machinery. The Pennsylvania Railroad has already bought heavily for equipment required in building the tunnels and the terminals in this city and in electrifying large portions of its lines, and will require still more as construction proceeds. The Erie Rail road will make very extensive improvements in Jersey City and will require a large amount of machinery for its shops. The Delaware, Lackawanna & Western will need more equipment for its locomotive shops and plant at Kingsland, N. J. The New York Central and the other lines which belong to the Vanderbilt system will buy heavily for new repair shops; they are expected to spend several millions of dollars for this purpose during the year. The New York, New Haven & Hartford Railroad is also about to secure a large supply of tools for a new repair shop. Nearly all the other railroads share in some measure in this general activty.

Among manufacturing industries which are likely to buy large amounts of machinery the new works to be built by the United States Steel Corporation and the Bethlehem Steel Corporation are the most extensive. The plans for these new plants have not yet been made public but requirements for machinery are certain to be large. The needs of the new plant under construction by Milliken Bros. Inc. have mostly been provided for but some additional requirements are still to be met. These are only a few of the largest interests which will swell the demand for machine tools during the year. Others while perhaps smaller individually will make up a far larger total.

The Niles-Bement-Pond shops are all running at top speed and some of them have shifts working extra time. Even then the sales are in excess of the output. More men are being put on as rapidly as they can be secured. The sales department recently booked an order which in the matter of values involved has seldom been surpassed: the share of the big Allis-Chalmers contracts secured will amount to more than $180,000.

The Ingersoll-Rand company is supplying the United Verde Copper Co. with an air compressor which will be the largest in Arizona. The compressor is of the compound Corliss type and weighs 296,000 pounds. The steam cylinders are 28 and 52 inches by 48 inches stroke, and the air cylinders are 26½ and 44½ inches respectively. The compressor is designed to supply 6060 cubic feet of free air per minute at an altitude of 5,000 feet and under a pressure of 100 pounds.

The Vandyck-Churchill Co. reports an excellent run of business and appears to have less trouble with deliveries than some of the other dealers, which is accounted for partly by the fact that a considerable supply of the regular types of machines was secured some time ago. The new branch recently opened in Pittsburg is enjoying a very satisfactory amount of patronage.

Machinery Demands Insistent.

The A. & F. Brown Co. is in the midst of a big rush of orders for power transmission material. A representative voices a very prevalent complaint thus: "Everybody wants it at once." Gear for rope transmission seems to be be in unusually brisk demand.

The Geo. V. Cresson Co. is also doing its utmost to supply the call for transmission material from new shops and new factories. A number of large inquiries from the south and west for special equipment are receiving attention at present.

The Curtin-Ruggles Co. is putting up a plant and has shipped the machinery for the manufacture of slag cement in Monterey, Mex. The new enterprise is connected with the Compania Fundidora de Hierro y Aciero whose steel works are located at Monterey.

Manning, Maxwell & Moore, Inc., shares in the common difficulty regarding deliveries, factories being unable to keep up with the sales. Two or three lists from the railroads are under consideration. A great demand for small lathes is noted with small stocks everywhere.

CARPENTER DEPARTMENT HEADS DINED.

The heads of departments of the A. Carpenter & Sons' Foundry Co., Providence, R. I., were tendered their fourth annual dinner at the Narragansett Hotel, Jan. 1, Henry A. Carpenter, treasurer of the concern, acting as host. Louis F. Patterson, a former foreman now connected with the United Shoe Machinery Co., Beverly, Mass., was a special guest, the other diners being Henry A. Carpenter, Supt. H. C. Arnold, Accountant O. C. Barrows, C. Harold Tholl, P. M. Waldron, F. O. Wilbur, W. D. Kent, Charles E. Allen, Graham Allerdice, H. A. McLellan, George F. Whipple, James O'Gara, J. C. Fillmore, Frank Rogers, Walter M. Saunders, Frank Bezanson, W. A. Short and Jesse B. Bicknell. The menu arranged for the occasion was a unique creation, each course, from the "Fluor Spar Oysters" to the "Cupola Stacks" having some special significance to the foundryman. The liquids were designated as "Molten Ferro," "Oil of Vitriol," "Strained Clay Wash," "Molasses Water," "Black Strap" and "Core Oil." When the "cupola stacks" were lighted, the following toasts were responded to; "How to Save Money," Henry A. Carpenter; "The Ladies," George F. Whipple; "System," O. C. Barrows; "Advantages of Machines," W. D. Kent; "How We Got a Million in 25 Days," D. G. B. Allerdice; "Be on Deck in the Morning," H. C. Arnold. Informal talks were made and Mr. Carpenter, on behalf of the foremen, presented Mr. Barrows with a handsome floral piece in the shape of a bull ladle.

James O'Donnell, 36 La Salle street, Chicago, has been appointed northwestern representative of the Empire Iron & Steel Co., Niles, O., handling this company's full line of iron, steel and galvanized sheets.

CARNEGIE STEEL OFFICIALS

Hold Annual Banquet at Duquesne Club, Pittsburg—Dinkey Reviews Year.

The annual banquet of the officials of the Carnegie Steel Co., was held Saturday evening, Jan. 6, at the Duquesne club, Pittsburg, and was one of the most successful of these yearly events ever held, both in point of those present and the advantage gained from the assembling, each year, of the operating heads of the great corporation in a social and semi-business session.

The banquet room of the Duquesne club was splendidly decorated for the occasion and presented a brilliant scene, with masses of flowers, delightful music and the luxuriant bowers of green fairly burying the great room and turning its space from floor to ceiling into a fairyland of beauty. The banquet table occupying the whole length of the room was oblong in shape and in the center was an immense bank of palms and ferns.

The menu card was an elaborate affair in the form of a ten page booklet bound in heavy board on the cover of which was emblazoned a reproduction of the gold framed portrait in oil of Andrew Carnegie, a gift of the Carnegie Veteran Association to the founder of the Carnegie Steel Co., at his New York home about a year ago.

Henry P. Bope, first vice president of the Carnegie Steel Co., was a witty and graceful toastmaster. Among the speakers were Alva C. Dinkey, president of the Carnegie Steel Co., Homer D. Williams, general superintendent of the Duquesne mills of the company, Azor R. Hunt, superintendent of the Homestead plant and James H. Reed, chairman of the board of the Carnegie Steel Co. The toasts, with the biblical or other quotations accompanying them on the menu, were as follows:

Henry P. Bope - - - - - **Toast Master.**

"I'll speak the kindest words
That tongue e'er uttered.
Or that art e'er thought."
—Dryden.

Alva C. Dinkey - - - - - **A Year's Work**

"Well done, thou good and faithful servant."

Homer D. Williams - - - - - **Animals I Have Seen**

"Nimrod was a mighty hunter."
—Gen. 10-8.

Azor R. Hunt - - - - - **A Home-stead—Not a Diocese.**

"Yet such vast impressions did his sermons make
He always kept his flock awake."
—Peter Pindar.

James H. Reed - - - - - **The Law as I Know it.**

"He is a perfect knowledge box
An oracle to great and sma'."
—Nicoll.

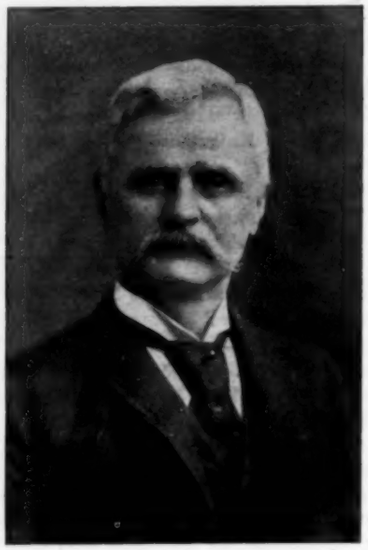
In his address Mr. Dinkey went quite extensively into the operations of the great corporation, told what had been done during the past year in comparison with former years and outlined what he expected from the various departments during the coming year.

Those present at the banquet were: H. P. Bope, W. W. Blackburn, L. C. Bihler, W. A. Bostwick, J. H. Blackburn, R. P. Bainbridge, W. R. Dalsinger, L. H. Burnett, J. P. Collins, W. R. Conrad, W. Ellis Corey, D. M. Clemson, J. J. Campbell, J. L. Clark, W. G. Clyde, A. A. Corey Jr., Alva C. Dinkey, W. B. Dickson, H. J. Davis, John W. Dix, W. I. Dithridge, H. A. Fennerty, E. J. Hamilton, H. P. Howell, A. M. Harper, I. W. Jenks, F. E. Jamison, D. G. Kerr, J. P. Kessler Jr., Homer J. Lindsay, John F. Lewis, W. B. Lewis, C. E. McKillips, W. C. McCasland, Thos. McDonald, F. R. McFeatters, Thos. Morrison, J. C. Neale, J. R. Ousler, N. M. Peterson, James H. Reed, W. J. Root, James Scott, E. E. Slick, W. McGilvary Shiras, H. L. Schotter, W. P. Siebert, Geo. E. Slater, B. H. Taylor, E. H. Utley, John S. Unger, H. D. Williams and Thos. Woods.

CAREER OF WILLIAM J. LEWIS.

William J. Lewis, one of the pioneer iron men of the Pittsburg district, and formerly a partner of the late Henry W. Oliver and his brothers in what are known as the Oliver interests died at his home in Hazelwood, near Pittsburg, January 3, after an illnes of several months. His death was reported in THE IRON TRADE REVIEW of Jan. 4. By his own energies, inventions and ingenuity he had worked his way up from a roll-turner to a position of wealth and influence and in 1896 retired from his active business enterprises.

Mr. Lewis was born in Pittsburg in 1832 and remained there all his life. At the age of 15 he was apprenticed to William Dewsnap to learn the trade of roll-turning and went to work in the Birmingham, Pa., mill of McKnight & Co., in which Mr. Dewsnap was a partner. After serving his apprenticeship he for eight years worked for Bailey, Brown & Co., and then formed a partnership with his brother-in-law John Phillips and later bought a small



WM. J. LEWIS.

nut and bolt factory where he laid the foundation for his fortune. He invented a machine for making nuts and bolts.

In 1863 Henry W. Oliver became a partner and the firm name was changed to Lewis, Oliver & Phillips and a large plant was erected on the South Side, Pittsburg, and the business expanded, several rolling mills being added. David B. Oliver and James B. Oliver became partners in 1866 and the business was again enlarged and large mills were erected in lower Allegheny. Mr. Lewis remained with the firm until 1880 when he retired and organized the Linden Steel Co., and continued in active business until 1896 when he retired and spent a large portion of his time in traveling. He was the owner of the Lewis block, Pittsburg, which when built in 1880 was the largest building in Pittsburg. He was associated with the Iron & Glass Dollar Savings Bank, was one of the officers of the Marine National Bank and an organizer and director of the Hazelwood Oil Co., beside having several smaller interests. He was married in 1855. William J. Lewis Jr., structural engineer of New York, is a son, who with six daughters survives the pioneer iron manufacturer.

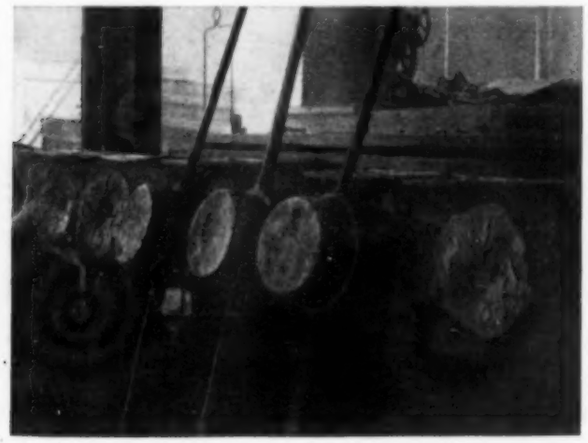
A syndicate has purchased the old Manson farm located near Franklin Furnace, N. J. The price paid is $60,000 and the value is said to lie in extensive deposits of iron ore and other minerals.

Plant of the Providence Steel Casting Co., Providence, R. I.

BY AN EDITORIAL REPRESENTATIVE OF THE IRON TRADE REVIEW.

The question has frequently been asked: Can a steel foundry be conducted with a single converter of the Tropenas type? The Providence Steel Casting Co. has one of the best arranged and most successful plants of this kind that we know of and it certainly shows what can be done with such a plant. The equipment consists of one 2-ton converter, one No. 1 Whiting cupola and one No. 3½ Whiting cupola. The larger cupola is used for melting stock for the converter and the smaller one for melting the material for re-carbonizing. There is also a stand upon which the large pouring ladles are placed to be heated by oil previous to pouring and a stand against which the bull ladles are placed for heating. The steel is blown so hot that it is all poured over the lip the ladle.

CONVERTER AND CUPOLAS, PROVIDENCE STEEL CASTING CO.



LADLE DRYING RACK.

SAMPLE CASTINGS.

The pulpit for operating the converter is located opposite the converter, that is, across the main bay of the foundry.

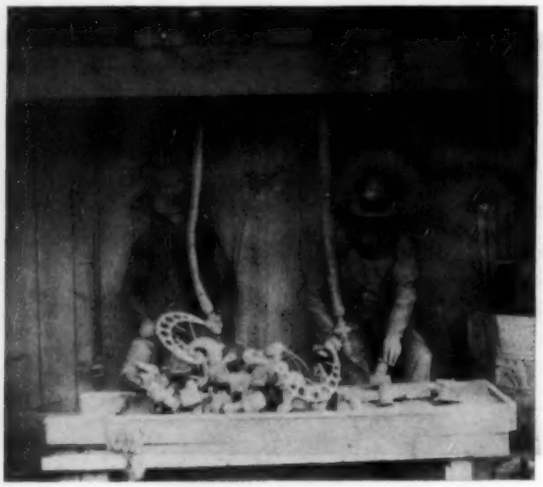
The handling equipment consists of one 10-ton, 50-foot span Shaw crane; one 4-ton jib crane for handling ladles about the cupola; one 1-ton jib crane at the large cutting off saw, together with special hoisting appliances at other points where they are needed. The material for the cupolas is taken up by an electric charging elevator, there being two charging platforms, one for the small and one for the large cupola.

The blast for the cupolas is furnished by one Roots blower and for the converter by a high pressure Roots blower, both being direct connected to General Electric Co. motors.

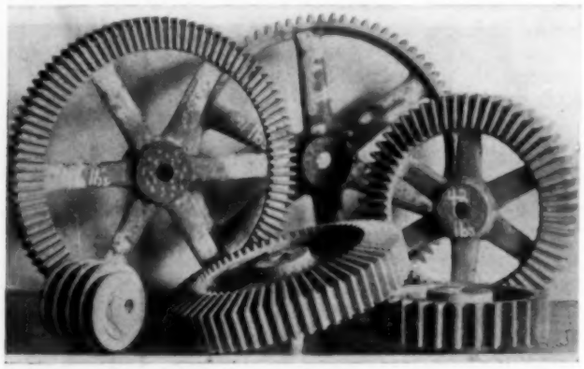
There are four Wagner cutting off saws, together with the necessary equipment of machine tools, including saw grinder, drill press, etc. For cleaning the castings there is a sand blast room arranged for two operators. For welding and repairing there is an electric welding equipment furnished by the Electric Controller & Supply Co., of Cleveland, O.

The power equipment for the foundry consists of two Almy water tube boilers, two high pressure compound upright Reeves engines direct connected to 75 kilowatt Gen-

PART OF MAIN FOUNDRY FLOOR AND MACHINE DEPARTMENT.



SAND BLAST CLEANING ROOM.



CAST STEEL GEARS.

eral Electric Co.'s generators, and one Ingersoll-Sergeant Drill Co.'s air compressor. The foundry is heated by the Sturtevant fan system, using the exhaust steam from the engines.

The company has remarkable shipping facilities, as it has both railroad and water connections, including a good wharf with deep water facilities. One point in the equipment which has been mentioned is worthy of special attention and that is the ladle heating device for heating the small and bull ladles. This consists of a flat plate against which the ladles are placed and heated by an oil flame projected from a hole opposite the center of the ladle. By this device the ladles are brought to a red heat on the inside before the steel is introduced into them.

The product of the company is well illustrated by some of the accompanying illustrations. One shows a number of gears, several of which are combined bevel and spur gears. Another shows a group of castings which were gathered together by the writer

CUTTING-OFF SAWS AND MACHINE DEPARTMENT.

and photographed while visiting the plant. The 2-foot rule placed across the top shows the size of the various pieces. The business card in the center of the group was placed there to assist in focusing the camera and also serves as a scale to show the size of some of the pieces. The large casting on the extreme right is made with a notched quadrant, every tooth of which had to be perfect or it would not pass inspection. The gate of small ratchet pawls shown in the upper left hand corner is partially obscured by the fin on the riser which occurred between the head and the upper face of the cope, but does not in any way interfere with the casting.

All of the work of the foundry is kept under the control of the chemist, the plant being equipped with a very complete chemical laboratory.

The officers of the company are: Darwin Almy, president; F. W. Hartwell, vice president; C. F. Almy, secretary; L. H. Miller, treasurer and general manager; and A. H. Jameson, superintendent.

Machinery Dealers' Convention.—The first annual meeting of the National Supply and Machinery Dealers' Association will be held at Hotel Chamberlain, Fortress Monroe, Va., Feb. 14, 15 and 16. Many items of interest will be brought before the meeting and a large attendance is expected. J. H. Drury, 69-71 Frankfort Street, Cleveland, is secretary-treasurer.

PERMANENT MOLDS

Discussed by Philadelphia Foundrymen—Election of Officers—Satisfactory Financial Condition.

The fifteenth annual meeting of the Philadelphia Foundrymen's Association was held at the Manufacturer's Club in that city on the evening of Jan. 3, when the following officers were elected: President, Thomas Devlin, of the Thomas Devlin Manufacturing Co.; vice-president Alex. E. Outerbridge, Jr., of Wm. Sellers & Co.; treasurer, Josiah Thompson, of J. Thompson & Co.; secretary, Howard Evans, of J. W. Paxson & Co.; executive committee, H. O. Evans, Thomas M. Eynon, E. E. Brown, R. C. Oliphant, George C. Davis; trustees, Thomas Devlin, Josiah Thompson, Howard Evans; official chemist, George C. Davis. In the absence of President Devlin, who, with many other members, was prevented from attending by a heavy storm, Dr. E. E. Brown presided, and Secretary Evans read a brief summary of the association's fifteen years. Organized on July 29, 1891, the association was the pioneer body of its kind in the foundry trade, and its success has led to the formation of similar organizations in other parts of the country and the American Foundrymen's Association and National Foundry Association. It now has about 100 members and is in a flourishing financial condition, with $1,800 in the treasury. It is worth noting that the present treasurer and secretary, Messrs. Thompson and Evans, have held those positions continuously since the formation of the association. The officers were given a formal vote of thanks by the association for their excellent work.

An interesting paper on "Permanent Molds and Carbon Cores," prepared by Henry C. Caldwell, of the Combination Foundry Co., Buffalo, N. Y., was read by J. W. Daniels, who showed a number of sample castings to illustrate the results secured by Mr. Caldwell. In a brief discussion which followed, the opinion seemed to be pretty general that the process was hardly feasible for large castings. Announcement was made by Mr. Daniels that a Delaware charter had been obtained that very day for the Caldwell Process Foundry Co. with a capital of $500,000, whose officers are: President, Franklin L. Sheppard, of the Isaac A. Sheppard Stove Co.; secretary, J. W. Daniels. Temporarily a portion of the foundry of the Sheppard Stove Co. in Philadelphia will be used, and arrangements are already so far advanced that the new company expects to be turning out castings by Feb. 1.

Permanent Molds.

Mr. Caldwell's paper was as follows:

The chill mold in which car wheels are cast is a success; that we concede, but inasmuch as it can be applied to no other work it is not very interesting to foundrymen in general.

The reason metal molds have not been practical except for very low melting point metals is because unequal expansion rapidly destroys the mold if it is thick enough to prevent warping. The hot metal will expand the inner portion of the mold very much more than the radiating heat will expand the outer portion.

It has not been hard for experimenters to conclude that carbon was the logical thing from which permanent molds should be made. This was because they had better results than with any other substance.

Several inventors were so successful in their experiments that they secured patents on "carbon molds"—two of them so long ago that their patents have expired by time limit

Experiments are apt to be made with lead or aluminum and so many duplicates produced from one mold that the inventor concludes that he has solved the problem only to find that when he pours gray iron or brass his mold ignites or gradually disintegrates from expansion and con-

traction, and that his only advantage over a metal mold is his low cost of production.

Like many others, the writer concluded, after carefully looking the ground over, that carbon was the only substance from which a permanent mold, in the sense we have in mind, would ever be made. He then began to study the problem and to repeat to himself the question, why is it that theoretically we can make permanent molds out of carbon but practically we cannot?

Having long since become a convert to the theory that all elements have their ignition point and that the only difference between any two things is the difference in temperature at which they are created or the speed and direction in which they are going, I began to reason like this: Carbon will ignite in contact with oxygen when the temperature arrives at the right point, and the right point varies according to the kind of carbon and the kinds of carbon vary according to the temperature at which they are produced.

For illustration take ordinary bituminous coal, place it in a retort and submit it to a temperature of 212 deg. F. and you will drive off steam but you will not affect the other constituent parts. Raise the temperature and drive off a certain amount of volatile matter or gas and you will have left a piece of ordinary coke. This piece of coke will ignite if it comes in contact with molten metal provided the melting point of the metal is higher than the highest temperature to which the coke was submitted. Suppose, however, you had continued to raise the temperature of your retort until you had carried it beyond the melting point of steel, for instance; then, the point of ignition of the carbon would be above the temperature of molten metal, and, as a consequence, it would not ignite when the metal was poured against it.

In order to test the theory, suppose you take a quantity of very fine, dry sawdust and apply a match to it. The result will be instantaneous ignition. Take the same quantity of the same kind of sawdust and subject it to a very high pressure, sufficient to reduce its bulk to one tenth its original size, and see how much longer it will take you to ignite it. The pressure does the same thing in a modified way to the sawdust as the high temperature does to the coke, because temperature and pressure are really the same thing.

Theoretically, then, the permanent mold problem was solved. All I had to do was to get some carbon (coke) produced at a higher temperature than the metal I intended to cast.

I secured a quantity of the hardest coke I could find and made some molds. I could pour aluminum castings indefinitely but when I tried brass I soon destroyed the mold.

My next move was to subject the mold to a very high baking heat with a view to raising the ignition point. In this I was reasonably successful; that is to say, I raised the point of ignition high enough to permit brass castings to be made but I had changed the shape of the mold so that the castings were not like the pattern. This was due to two causes: First, the surfaces of the molds, both inside and out, were disturbed by the gas as this temperature which was higher than that at which the coke was produced drove off; and, Second, because in baking the mold the temperature of the oven was uneven, being hotter on the bottom than it was on the top, which resulted in the bottom expanding before the top and causing a number of small cracks which so weakened the mold that it soon went to pieces.

By this time I came to the conclusion that the coke would have to be produced in the first place at a temperature high enough to drive out all of the volatile matter that would come out at say 4,000 degrees F. Having been a student of temperature for many years, and having, as I believe, succeeded in producing a fire many degrees hotter than is considered possible by many recognized authorities on chemical combustion, I began to look for a method of applying my knowledge to the manufacture of coke. This was not very difficult and in a short time I had what I was looking for and again proceeded to make molds.

I found even this did not overcome all my troubles. It was still necessary to bake molds and it had to be done at a temperature so far above the melting point of the metal, that the limit, 4,200 degrees F. claimed by most scientists as the height of temperature possible by chemical combustion. would have to be very much exceeded.

I wanted an oven with a temperature absolutely uniform and even in every part, top, bottom, sides and center and I wanted that temperature to be over 4,200 degrees F. You can readily understand that if my oven was to attain this temperature throughout I would have a temperature far above this outside the oven. It took many weary days and nights to work this out. In fact, it ran into months and finally into years, but I succeeded; otherwise, I would not be here to-night.

Students and thinkers have latterly concluded that the only limit to temperature by chemical combustion is the means of controlling or rather containing it.

Molds baked in a 4,000 degree oven will withstand any molten metal up to and including steel. They will not expand or contract and see mto get better and better the longer they are used. If any of my hearers are skeptical they may test me out, and to this end I will launch a challenge at the risk of being convicted on the charge of boasting: I defy any of you to bring me a refractory substance, such as carbon points for arc lights, carborundum from the electrical furnaces at Niagara, or pieces of crucibles that I cannot reduce in fifteen minutes. I would like to be in a position to demonstrate this whole matter to you all but we are not yet through with the Patent Office and until we are, self preservation demands that we do not reveal our system or the construction of our furnaces except to the persons interested as stockholders in our company. Personally it is my desire, and I think my duty to give the results of my years of study to the world at large, demanding as a reward three meals a day and a place to sleep, but I am not in so fortunate a position because three meals a day and a place to sleep have been advanced to me by friends who had confidence in me and the ultimate results and, further, because it will cost a good many dollars to make the world at large believe that I have done what is here claimed and that I can do it again on a larger scale.

I think I hear some of you asking how I am going to take care of the shrinkage of the castings. It will surprise you to learn how many castings that at first seem incapable of being produced in permanent molds can be very readily handled.

Franklin L. Sheppard, whom most of you know and whom all of you have heard of, will be the first president of the company we are about to form. His business is manufacturing stoves, a field that on first thought one would think it very dangerous to enter. As a matter of fact we have figured out how it will be possible to make almost every part either in a permanent mold or parts of permanent molds. The rings, for instance, will be made in molds the outsides of which will be permanent and the centers sand to take care of the contraction which is all inward, and the molding machine will need a big handicap to beat us out.

The only question open is, how much carbon will be taken up by a steel casting?

My own opinion is that not enough will be taken up to

change the analysis for the reason that the mold will not give up anything if you keep below the temperature in which it was baked. A number of steel experts agree with me on this point and none dispute me. My experiments have been very limited with steel because by the time I get up to and include gray iron I am in a field so wide that I do not expect to feel cramped.

A step in advance often makes it necessary, or at least advisable, to take another. It was only a short step but nevertheless a very important one from the carbon mold to the carbon core, and then another one to the carbon core box.

Core boxes are made exactly the same way and out of the same material that we make permanent molds. It is only necessary to have a core made in the usual way or a pattern such as you would have to make a casting, then make the box in sections, put the sections together, hold the box under a hopper containing an absolutely dry powder, fill the cavity, shake it down a little and place the whole thing in an oven with about a fifteen hundred degree temperature and in from five to thirty minutes, depending on size, the core is ready to take out of the box and as soon as it cools enough to be handled it is ready for use. This will, as a matter of course, be much more valuable for intricate than plain work. By this system one is no more difficult than the other, but plain shapes are now made very cheap by the old process. Another great advantage is that a boy or a girl strong enough to lift the box can make a core as good as the most skillful core maker. Venting is practically done away with as the red heat to which they are submitted drives out all the gas that was in the carbon and leaves the core so porous that it will easily take up all the gases that may be in the metal.

These cores may be kept indefinitely and when we are through with them we grind them up and use the powder over again, or put them in our fire where they are worth almost as much for fuel as they cost to make originally. This material is much cheaper than any core compound I know of.

I did not select the proper binder for this powder the first time trying and my advice to you is not to wear out any gray matter in an effort to learn what it is. I was standing on my head when I thought of trying it and as very few of you would care to remain long in that position just bide your time for a few months and I will tell you all about it.

I have a very rapid process for making copper patterns, a thousand of which can be made and they won't vary a 64th of an inch. Also a dry sand process that made possible the small cylinder shown you, and by which I have been doing some very interesting stunts in multiple molding, but as they are really foreign to the subject of the evening we will not go into their field.

This paper is submitted against my judgment, but at the earnest solicitation of a number of my friends who seem to feel that because I am about to move from Buffalo, N. Y. to Philadelphia, I should embrace the first opportunity of getting acquainted with the foundrymen in this vicinity.

I do not agree with my friends on this point and I am going to tell you the reason frankly at the risk of hurting some of your feelings. History says, and my own experience has taught me, that most new discoveries that are revolutionary are nursed in their infancy and matured by people entirely outside of the line of business to which they will apply if successful.

TIN PLATE WORKS IN CANADA.

Establishment of New Plant Source of Much Discussion—Steel Corporation Rumors.

(Special Correspondence.)

Toronto, Can., Jan. 8.—The projected establishment of tin plate works at Morrisburg, Ont., is exciting a good deal of local interest at present. The municipality has made extensive concessions to the Canadian Tin Plate & Stamped Steel Co., to ensure establishment of the industry, including 750 horsepower of electric energy to be developed on the canal. This was conditional on the town getting a lease of the power from the canal. Last week two rival deputations from Morrisburg waited on the Canadian government. One comprised citizens who were apprehensive that the agreement with the company was not sufficiently binding and that the franchise might be used for speculative purposes. They asked the government to provide safeguards in the interest of the town so that the company would carry out its stipulations. Later another deputation headed by the town officials urged the granting of the lease of power by the government without delay, claiming that $100,000 had been already expended in buildings and works and that a further sum of $250,000 would be laid out as soon as the power was assured.

Steel Corporation Reports.

The report of the intention of the United States Steel Corporation to establish a branch in Ontario is not generally credited in financial circles here. Those conversant with the situation point to the intrinsic improbability of such a movement, in view of the fact that the present extraordinary demand for steel goods is essentially of a temporary character, and that the period of railroad extension, to which it is mainly due, cannot continue on anything like the present scale for more than a few years. As it would be fully two years before a new industry of the kind would be ready to manufacture, the opportunities for a profitable trade would be very limited. The frequent recurrence of these reports is regarded in some quarters as designed to influence the Canadian trade in favor of some kind of an understanding with the American steel interests—in consideration of the latter refraining from entering the field of production here, and may be further stimulated by those interested in local real estate booms.

The Grand Trunk Railway has placed orders for 20 passenger and 61 freight engines, costing in all approximately $1,398,000. The locomotives when completed will be placed in service wherever needed on the system.

The record of the Dominion Iron & Steel Co., of Sydney, N. S., for 1905, shows an output of 162,000 tons of pig iron; of the open-hearth steel furnaces 173,000 tons; and of the rolling mills 47,000 tons. Of 80-pound steel rails 44,000 tons have been turned out. The company consumed over half a million tons of coal and 480,184 tons of iron ore. During December all departments of the company broke all previous records. The blast furnaces produced 21,000 tons pig iron, the open-hearth furnaces turned out over 20,000 tons of steel and the output of the rail mill was about 10,000 tons. The rod mill broke the world's record for a monthly output on a continuous mill with an output of 6,700 tons of wire, beating the United States Steel Corporation's mill at Sharon, Pa., by about 500 tons.

C. M. Kittson, Canadian, commercial agent for South Africa, reports that the trade in wire netting has hitherto been in the hands of English manufacturers, but that as they have considerably advanced prices the time is opportune for Canadian manufacturers to make a bid for business.

IDEALS IN INDUSTRIAL ENGINEERING.*

A Plea for the Betterment of Factory Condition.—Relation of the Labor Union.

BY H. J. F. PORTER.

There is an acknowledgment of the basic fact that, to secure the ultimate efficiency of the working organizations in both office and shop, the human element in each must be accorded recognition.

It is this feature of the broad field of what I shall here term industrial engineering that I desire to bring to the attention of the society in this paper. We have insensibly drifted away from the patriarchal system of management which existed as late as twenty-five or thirty years ago, in which the owner of a shop was manager, superintendent and workman, who knew little about shop organization but associated with his men on intimate and cordial terms. As manufacturing plants have grown in size and the workmen have differentiated their trades, a type of military organization has gradually developed in the shops in which the manager, superintendent and foremen are officers, who instead of being expected to take part in turning out the product of the plant are, on the contrary, experts in shop management, and see that the machine of which the workmen are parts is kept in proper working order. In this way the old personal touch between master and men has disappeared entirely. But human nature has not changed. That element still exists in the organization, and if the full strength of the latter is to be secured it must be accorded recognition. No matter how perfect may be an accounting system, if it is carelessly or unintelligently applied, it becomes worse than worthless because it will be misleading in its results. No matter how perfectly suited to their purpose the machines or efficient in quality or shape the cutting tools, unless they are skilfully manipulated the product will be unsatisfactory, and so in either case the outcome of an enterprise possessing mediocre talent in its working forces will be jeopardized. In order then to insure a successful issue to a manufacturing venture we must look beyond the mechanical assets to the qualifications for efficient service possessed by the organization of supervisors, clerks and operatives; and it will be found that the measure of success attained will be determined by the standard of excellence of those qualifications.

I do not wish, however, to be understood as underrating the value of a high grade mechanical equipment, but I do wish to emphasize the greater necessity of possessing as highly efficient an organization as can be secured; for a capable organization can make the best of a poor equipment and produce good results whereas an incapable organization will not only fail to make a fine equipment productive of good work but probably in a short time will destroy the equipment itself.

Mr. Carnegie, when asked by a number of financiers whether he thought that the difference between one style of organization and another amounted to much, providing the company had an up to date plant properly located, said in effect that should some great catastrophe destroy all of his mills but spare his organization, which had required many years to perfect, he might be inconvenienced temporarily but that he could depend upon his organization to re-establish his business. If, however, he should lose his organization, even if his mills which were the best in existence were left intact, he would not have time nor strength to rehabilitate himself in the business world.

The lesson taught generally by the foremost enterprises of the day, in their respective industries, is that their success has been largely due to the efficiency of their working forces. Thus in recent years the importance of possessing a high grade organization has impressed itself more and more upon the mind of the business manager so that at the present time this possession is considered, by those who are most competent to judge, by far the most valuable of all commercial assets.

Considering for a moment the functions of the organization, together with its circumscribing limitations, it must be recognized initially that if one man automatically dominates it, its scope of expansion can never be any greater than what he can himself devise. Also that the character of work which may be realized from the organization as a whole will be no better than can be produced by the individuals that compose it.

What then are the qualifications with which a high grade organization should be endowed in order to attain a high standard of efficiency? In as much as, after all, an organization is but a collection of human beings, it stands to reason that if as an entity it is to be of high grade the units of which it is composed must also be of that grade.

No matter how moral or intellectual a man may be, if he is a weakling, if he has not health, he cannot be an efficient part of an active organization. First of all, therefore, the members of the organization must have health, they must be strong and vigorous.

Next he must be of high character, for no matter how healthy or intelligent a man may be if he is immoral, i. e., if he is dissipated, if his time outside of his working hours is given over to intemperance, gaming, or other forms of vice, his condition physically and mentally while at work cannot be such as to qualify him as an efficient member of a high grade organization.

And finally, it is evident that given a man of good physique and strong character, the higher his intelligence and skill in the direction of his duties, the better qualified he will be to accomplish his daily tasks; but it is also evident from the preceding considerations that important as are these latter qualifications they must be subordinate to the other two and considered last in relative importance.

Now, I claim that the ordinary system of management in selecting and maintaining an organization, reverses the order in which the value of these qualifications for membership is estimated. The questions usually asked an applicant for employment are:

First. Have you had a college education?
Second. What has been your practical experience?
Third. Have you ever been discharged? If so, why?
Fourth. For whom have you worked?
Occasionally: Are you a drinking man?

Now, although we have seen that the human asset is of greater importance in an industrial enterprise than its mechanical possessions, I think I can safely say that infinitely more pains are taken in obtaining a machine or tool, to see that it is covered by detailed specifications and inspected during construction and before acceptance than is given to securing the man who will be put in charge of it and held accountable for results from it afterwards.

On the other hand, we rarely hear of a recognized labor or employment department in a shop, and when there is one it is seldom intelligently administered. Usually little care is taken in the selection of the man, and no thought is given to their improvement during their time of service. They are taken on and laid off without a thought of consideration for their welfare or convenience, and they frequently live with a sword of Damocles hanging over them, continuously expecting on any pay-day to find their discharge ticket in their envelope. No men can work at their best efficiency under these conditions.

Now there is one marked difference between machines

* Abstract of a paper presented at the New York meeting of the American Society of Mechanical Engineers, Dec., 1905.

and the men who operate them which should be noted here. Machines, no matter how well they may be cared for, depreciate from five to ten per cent per year owing to the advent of other and improved machines, while men, if they are properly cared for may appreciate in value several hundred per cent in the same time. Yet I maintain that as a general rule machines and tools are nurtured, fostered and preserved long after their period of usefulness has expired, while the permanency of service of the men of the organization who operate them receives comparatively no consideration.

I think these statements are facts based on the aphorism that the exception proves the rule. For there are exceptions so conspicuous as to make the rank and file of manufacturing concerns in this regard seem commonplace.

Our ideas about the treatment of men by those in authority have undergone a vast change in the past few years.

Huxley says: "There are two opposing methods at work in the government of the world, respectively, the ethical and the cosmic. The practice of that which is ethically best involves a course of conduct which in all respects is opposed to that which leads to success in the cosmic struggle for existence. In place of thrusting aside or treading down all opposition it requires that the individual shall not merely respect but help his fellows. Its influence is therefore directed not so much to the survival of the fittest, but the fitting of as many as possible to survive."

The tendency of the times now is directed away from the cosmic and towards the ethical method of management in industrial and commercial affairs. We are beginning to realize that no success counts which is obtained at the expense of others.

In fact that no life is worth very much which does not consider the welfare of others. The United States Government for the first time at any industrial exposition exhibited at St. Louis last year a large number of photographs and pamphlets descriptive of methods of industrial betterment adopted by leading manufacturing concerns in this country, thus showing the present trend of thought in this direction. The United States Bureau of Labor in its report for 1904 dwells especially on the increase in the number of concerns which have taken this advanced stand. Teachers of political economy in colleges, leading clergymen, lawyers, statesmen, everywhere are advocating the adoption of ethical principles in business dealings. President Roosevelt voices this sentiment in his advocacy of giving the other fellow "the square deal," which after all is only a modern way of expressing the Golden Rule which political and social economists all say is the most practical rule of life ever enunciated.

The study of cause and effect in the example set by those concerns who have applied these principles has demonstrated that they pay in a financial way. This latter fact comes as a surprise to many but so also did the fact that model tenement houses pay better in the long run than those of the old type. That establishments who have adopted these methods are continuing to apply them and are extending their application is significant that they are pleased with their results.

The National Civic Federation has established local industrial betterment branches about the country with the object of encouraging manufacturing concerns to adopt the most approved methods of organization and management in the hope of bringing about a better feeling between employer and employe. An effort in this latter direction must be at the foundation of every individual movement on the part of any manufacturing concern which desires to advance along modern lines.

Mr. Alfred Moseley, a rich philanthropist of England, exercised over the threatened commercial supremacy of his country by our industrial advance, brought here in 1902 over twenty labor leaders of different industries to investigate the difference between American and English industrial practice.

His visits were naturally cofinned to the representative shops in the principal cities and his report stated that his observations led him to note the superiority of our methods;—first, of wage payment, largely by one or another of the merit systems;—second, of encouragement offered to develop the initiative of the workman and to get him to suggest improvements by paying a premium on them;—and third, of having the individual workman operate as many machines as he could handle, and when new and more efficient machines come on the market the scrapping of the old ones, although they may be comparatively new.

Mr. Carnegie has coined the happy simile that successful industry is a partnership of labor, capital and brains; like a three-legged stool, the legs of which are of equal strength, no one superior to the other. And Mr. Moseley emphasized the advantage that we obtained in our works by encouraging the workmen which were not only totally neglected in England but absolutely suppressed by the attitude of the foremen, who feared that their positions would be in jeopardy if a workman showed that he had any originality.

Influenced, however, by the example of the leaders in thought and action, many concerns have recently experienced a change of sentiment and sought the co-operation of their employes. The change of attitude from one of mutual suspicion to one of mutual respect and confidence is not however effected either readily or rapidly. Traditions cannot be destroyed by a simple dictum. Misunderstandings occur in the transfer which delay or offset the proceedings. Some concerns have become discouraged and have discontinued the attempt; others, however, have succeeded and are proud of their achievement. There is a right way to go about it and there are many wrong ways. Care must be taken that the right kind of people represent the management and the men are selected to accomplish the result.

A system of shop management which is suited to one industrial enterprise may work only indifferently in another and be a complete failure in a third. This statement may seem to be trite and unnecessary, but I know from my own experience that as long as men are constituted as they are, whenever unusual conditions develop in a shop under any form of management, suggestions as to remedies which have been successful elsewhere are at once made by people who are well meaning but have no knowledge of the actual situation. This is empirical, and Mr. Charles Francis Adams, of Boston, in a recent paper on Industrial Conference says that "in these (industrial) matters empiracy is of all things to be shunned." What is needed is a careful study by those whose knowledge of the conditions as they exist constitutes them as most competent to analyze the situation and deduce proper methods of procedure.

In any manufacturing enterprise a standing committee on which both employes and management are represented which meets at stated intervals is an excellent method of "getting together" those who are competent to act that each may see the other side of the shield and obtain the other's point of view.

There are frequent occasions arising when the manage-

ment is anxious to know what attitude the employes would take in case a change in policy is made. On the other hand, the employes from time to time wish to lay a request before the management. In either case some temporary device is usually resorted to to meet the occasion. When a standing committee exists, however, a channel of communication is always open and each side keeps thoroughly in touch with the other on all matters of common interest. An honor system is thereby established among the employes and the discipline improves greatly. I have never failed to see a marked change come over the entire organization as it rose to its responsibility as soon as the members felt that they were accorded recognition as rational beings and to be consulted on matters of common interest. Generally the rank and file of the working organization is considered in the same category as the privates in an army, they are not supposed to think but to do as someone above them has planned. The usual result, as might be expected, is that they do not use their brains for the benefit of the concern.

All questions regarding systems of wage payments should come before the standing committee. The introduction of any of the various merit systems can be brought about in a shop with little difficulty if the subject is intelligently discussed by the committee in advance. And I should say here that as all men work primarily for their support the wage question is the one which must be settled first and satisfactorily before any schemes of industrial betterment can be effectively developed. Men work for wages, and will go where they can get the most pay. But of two concerns, each paying the same wage, the one which extends the better treatment to its employes will be favored by the applicants for employment and by judicious methods it can obtain the better class of help.

Some work of common interest must be developed to engage the attention of the standing committee and the sub-committees which later may be appointed to handle details. The "Suggestion System" now so generally adopted by the foremost concerns, is a good subject for the committee to handle. This system develops in the operatives the power to observe, improves their capacity of initiative, and inspires their ambition. It has, besides, the great advantage of being in itself a paying institution both to the employe and the company, when the latter pays well for valuable suggestions.

This system may include suggestions from the employes regarding improvements in their own conditions of comfort and work. No one knows better than the workman himself if he is not working under the most comfortable circumstances, but he will naturally hesitate to complain. Yet everyone knows that a man when comfortable can do better work than when he is uncomfortable, and should be given an opportunity to express himself regarding his condition.

The system should also include suggestions regarding improvements in processes and methods of work. The operative, if encouraged to think, will soon effect great savings in the work at which he is more of an expert than any one else who is not constantly engaged at it. I have recently seen a product considerably redesigned, the process of manufacture simplified and made much cheaper and the company put upon its feet largely through the introduction of the suggestion system.

Meetings of the foremen should be held regularly, and instruction given to them in the proper handling and management of men to secure the best efficiency within the limits of fair and just treatment. It must be understood that in order to secure the best quality of work the mind of the worker must be as free as possible from worry about his position. Peace of mind cannot be maintained while conditions exist which entail arbitrary discharge from service or unexpected reduction of wages, nagging by foremen who are affected by favoritism, ineffective facilities for service, unpleasant and unhealthful surroundings, danger of accidents from unguarded machinery, or loss of life in inflammable buildings inadequately supplied with means of escape. On the contrary credit should be given to each employe for every effort to do his part in advancing the interests of the company. A little encouragement at the right time will do much to arouse ambition and enthusiasm, without which nothing of moment is accomplished.

I have already shown that health, character and intelligence in the order named are the essentials to be sought for in selecting an employe and when found should be fostered and improved. First, then, efforts should be made to raise and maintain at a high grade the standard of health of the organization. Good health means capacity for work both in efficiency when at work and through increased regularity of attendance. Irregularity in attendance is one of the banes of good management and it can only be improved by a careful investigation into its causes and application of the proper remedy. Mutual benefit associations are now quite general, but those where either a doctor or trained nurse is engaged to instruct the employes how to prevent sickness as well as to administer prompt and effective treatment during incapacity for work are effective means of increasing efficiency. Instruction how to live properly, how to cook simple food, how to eat, bathe and sleep, and warnings against the use of patented nostrums will tend to preserve the health of the organization and raise the regularity of attendance. The latter can also be effected by the payment of a bonus annually to those whose presence has met a certain percentage of regularity. A warm lunch will increase the efficiency of the organization during the afternoon and facilities for obtaining it should be offered. Means afforded for exercise and amusement in the open air at noon, especially when the occupation is confining and sedentary will also have the same effect. The character of the individual should be a no less important consideration in the mind of the employer than his health. It is very necessary to know whether or not the employe can be relied upon in the quality of his workmanship and in his effect upon others in the organization. Some managers say that they are not interested in knowing what their employes do outside of working hours. Some employes say it is none of the manager's business what they do in their own time. When, however, what the employes do in their time affects what they do in their employer's time, then it may be to the latter's interest to look into such matters. What the employer should desire is to have as few changes take place in his organization as possible. Now it should be remembered that in every factory there are apt to be many operatives who because they are strangers in the locality or from reasons consequent to their condition and circumstances have no opportunity for social recreation and pleasures and no places to go to after working hours. Therefore being more or less creatures of circumstances they drift into associations and habits which may be debasing in their tendencies. This sort of thing leads to a lowering of the status of the organization through association, if they remain in it, or to an unsettled state if there are many changes due to constant removals. The social instinct in man causes him to seek companionship, and if opportunity is given the members of the organization to attend lectures and other social gatherings which are attractive and at the

same time elevating in their tendency, the whole fabric of the organization becomes homogeneous of high grade and remains intact. And, finally, the education of the employe should receive the attention it deserves. Early opportunity should be seized to improve the mind of the employe as he grows. The wider his knowledge, the better he will perform his duties.

Apprenticeship schools in operation during working hours under the charge of a trained teacher are effective means of developing the mentality of the organization and at the same time of getting in close touch with the employe early in his career, and the longer he stays with the concern and the more money is spent on his improvement the more valuable he becomes as an asset and the greater the effort should be made to retain him in the organization.

Care should be taken, however, not to coddle the organization. Coddling engenders weaklings. Extending opportunities so that the employes can help themselves develops self-reliance, self-respect, and, at the same time, regard for the management. Such a policy promotes a strong and healthy organization. Employes are quick to feel any interest taken in their welfare, and as quick to reciprocate. To increase the efficiency of an organization so that each employe is not only a passenger in the enterprise but effectively pulls his own weight, is the function of this new field of industrial engineering.

Mr. J. T. Hawkins' Discussion.

Among others, Mr. J. T. Hawkins discussed the above paper. He dealt with the relation of the trade union to industrial betterment and said in part:

This and similar attempts to improve industrial economics are only gaining at the spigot with the bung out, while being done in the face of trade unionism and its acts, professions, aims, and powers.

Even after some little amelioration of its worst and most indefensible features in later years, it still stands an inexorable ogre in the pathway of industrial progress.

There is no worse part of the trade union traditions, principles and every day practice—Mr. Gompers to the contrary notwithstanding—than their palpable, and to a great extent, acknowledged aim to reduce "productivity," and to keep it at a minimum, not only quantitatively but qualitatively as well. The *New York Sun* has recently editorially, and cogently, said: "One of the falsest arguments of unionism is that an increased individual efficiency, or productivity, would restrict the demand for labor. Its claim is that the competent must be restrained or an army of incompetents will starve for lack of work."

And herein lies the gist and gravamen of the generalization that until the industrial world can succeed in transforming trade unions into instruments for the increase of productivity, instead of as now and in the past, instruments for the minimization of product, or, increasing its cost, can our fine spun theories and practical refinements looking to the clipping off of a fraction of cost here, or increasing capacity there, or for the introduction of some well considered shop organization with the same end in view, all go for naught, and must continue so to do so long as the giant of labor unionism stands in the way.

The *Sun* further says: "Unionism prates most about improving the condition of the wage earner. "Taking its conduct rather than its words as an indication of its real belief, unionism sees in more money and less work the only pathway to improvement. It seeks to open that pathway with the club of monopoly.

"Unionism of today needs nothing else so much as it needs leaders who will preach to their followers the daily output exceeds in quantity or in quality the product of the average of his fellow-workers, has that for which employers stand always ready to pay a wage which is even above the 'wage scale' demanded by unionism. The protest of employers is against the demand that the loafer and the incompetent, merely because they hold a union card, shall be paid on the basis of highest efficiency. Unionism fails to see how its present policy in many ways reacts upon labor itself through an increase in the cost of articles of daily need and consumption."

One very important feature in the increased cost of production through the operations of labor unions without pecuniary benefit to wage earners, is the enormous amount of money required to meet the expenses of unionism; dues and assessments on members to provide the union treasuries wherewith to hire halls, pay walking delegates, salaries of leaders and sub-leaders, and last but not least, to support in idleness men on strikes; all this constitutes a charge upon product in the shape of increased wages in which the workman has no share.

The first prerequisite of anything like mutual conferences between men and their employers, having for their object their mutual good, must be the disarming of the labor unions of the club or clubs, with which, as the *New York Sun* says: "They seek to open a pathway of monopoly." The closed shop, the cowardly boycott and its no less cowardly cogener, the unfair list, so called, the limitations of apprentices, the sympathetic strike, the persistent efforts of the labor unions to emasculate labor saving devices and methods, are due to the clubs which must be wrested or reasoned out of the hands of wage earners before we can hope to improve the economics of the industrial world by any such means as we advocate in this and cognate papers.

That greatest of their clubs, the closed shop, has been wielded by the unions with such effect, that at last the employers of the country, seeing that their very existence is at stake, have taken a stand, and already the day is breaking, promising an early release from their worst of all tyrannies.

The industrial world must take the stand that every shop or industry must be an open one; then we may be able by conference or otherwise, to convince wage earners of the error of unionism as now carried on, and finally bring about that fraternity between employers and employed so much to be desired, and which would surely result in great gain to both, pecuniarily and otherwise.

Calendars for 1906.—An unusually handsome lot of calendars for 1906 is being distributed by the various companies in the industrial world. The Marion Steam Shovel Co., Marion, Ohio, is sending out a large wall calendar with a number of illustrations in colors, showing applications of the steam shovel. The Roessler & Hasslacher Chemical Co., New York City, is distributing one illustrated with a scene on Patzcuaro Lake, Mexico. J. F. Corlett & Co., Cleveland, have gotten out an exceedingly attractive small calendar, illustrated with a colored photograph of a barefoot boy returning from a successful day's fishing. A very useful calendar also is the one distributed by Matthew, Addy & Co., Cincinnati. F. E. Meyers & Bro., Ashland, Ohio, have brought out one covered with illustrations of their pumps. That distributed by the Jeffrey Mfg. Co., Columbus, Ohio, is extremely attractive and useful. H. B. Underwood & Co., Philadelphia, have issued one for the railway and machinery people, which is well printed, with large figures.

Plants Being Built in December, 1905.

The *Bulletin* of the American Iron & Steel Association publishes the following information concerning rolling mills, steel works, bloomaries, and tinplate and terne plate plants in course of construction in December, 1905.

Rolling Mills and Steel Works.

Halcomb Steel Co., Syracuse, New York. Construction commenced in April, 1905; being equipped with basic and acid open-hearth steel furnaces, crucible steel-melting furnaces, trains of hot rolls, and hammers; product, hammered and rolled bars, sheets, and drawn steel wire and bars for tool steel and other high grade steel. Fuel, coal and oil.—Will probably be ready for operation in January, 1906.

Milliken Steel Works, Milliken Brothers, Incorporated, 11 Broadway, New York City. Building works at Milliken, Staten Island; construction commenced in Dec., 1905; being equipped with five 50-gross-ton basic open-hearth steel furnaces with an annual capacity of 160,000 tons of ingots, 2 continuous heating furnaces, and 2 trains of rolls (one 40-inch blooming and one 28-inch structural, the latter having one 2-high 32-inch reversing mill); product, beams from 5 inches to 24 inches, channels from 6 to 18 inches, angles from 8 by 8 to 2½ by 2½ inches, and zee bars, flats, etc.; annual capacity, 150,000 tons. Also build all kinds of structural iron and steel work for bridges, buildings, etc.—Will probably be completed in September, 1906.

New York State Steel Co., Buffalo, New York. Construction commenced Dec. 1, 1905; two 200-ton basic open-hearth Talbot furnaces with an annual capacity of from 100,000 to 120,000 tons of ingots, four 4-hole soaking pits, and one 2-high, 36-inch blooming mill; product, slabs, blooms, and billets; annual capacity, from 100,000 to 120,000 tons.—Will probably be completed in October, 1906.

Roebling's (John A.) Sons Co., Trenton, New Jersey. Building works at Kinkora, N. J.; construction commenced in the summer of 1905; being equipped with heating furnaces, wire-rod trains, etc.; product, steel and copper wire rods. Fuel, manufactured gas and coal. When these works are completed and in operation the modified Garrett wire rod mill now in the company's plant at Trenton will be removed to Kinkora and remodeled. The other departments of the Trenton Works will not be removed. The Kinkora works will probably be completed in the summer of 1906.

Fischer Foundry and Machine Co., Pittsburg. Works at Ford City, Pa. Adding one Raapke steel converter to an iron foundry; product to be steel castings.

Fort Pitt Steel Casting Co., Park Building, Pittsburg. Erecting works at Christy Park, near McKeesport, Pa.; construction commenced in December, 1905; one 2-gross-ton modified Bessemer steel converter and one cupola; product, steel castings; annual capacity, 1,200 tons. Fuel, natural gas.

Janson Steel and Iron Co., Columbia, Pa. Construction commenced in July, 1905; being equipped with 6 double puddling furances, 5 heating furnaces, and 4 trains of 3-high rolls (one 22-inch muck, one 22-inch billet, one 18-inch bar, and one 12-inch merchant); product, bar iron and steel; annual capacity, 20,000 tons. Fuel bituminous coal. A part of the machinery used in equipping these works was removed from the company's dismantled rolling mill at Oxford, N. J.—Will probably be ready for operation in January, 1906.

National Cast Steel Co., Wilmington, Delaware. Works and office at Avonmore, Pa. Construction commenced July 1, 1905; one 2-gross-ton modified Bessemer steel converter and one cupola; product, steel castings for the trade; also gray iron castings; specialties, steel fastenings for steel railway ties and split steel pulleys; annual capacity, 5,000 tons.—May be ready for operation in January.

Pennsylvania Swedish Iron Co., 307 Empire Building, Pittsburg. Building a rolling mill at Cheswick, Pa.; construction commenced in November, 1905; being equipped with two scrap furnaces, one contiuous heating furnace, and one 16-inch train of rolls; product, charcoal boiler tube skelp iron, scrap bars, low-phosphorus bars, and high-grade merchant bars; stay-bolt iron a specialty; annual capacity, 25,000 tons. Fuel, natural gas and coal. Puddling furnaces and muck and plate trains for the manufacture of charcoal iron plates and sheets will be added early in 1906. A charcoal forge is also being built.—Will probably be completed in January, 1906.

Velte Foundry and Machine Co., Pittsburg. Adding to its works at Home street and Allegheny Valley R. R. one modified Bessemer converter for the manufacture of steel castings; annual capacity, 2,500 tons.—To be ready for operation in January.

Crescent Rolling Mills, Virginia Iron, Coal, and Coke Co., Bristol, Va.-Tenn. Works originally built at Max Meadows, Va.; part of machinery removed to Bristol in the fall of 1905; construction commenced on the Virginia side of the state line on November 1, 1905; being equipped with 10 double puddling furnaces, 5 heating furnaces, 2 forge fires, and 3 trains of rolls (one 9, one 12, and one 18-inch); product, merchant bar iron; annual capacity, 20,000 tons. Fuel, coal.—Will probably be completed in March, 1906.

Broomall (The) Iron and Steel Co., Belington, West Va. Construction commenced in October, 1904; being equipped with 4 pair, 4 sheet, and 2 annealing furnaces, three 9,000-pound steam hammers, and 6 sheet mills (three 24 by 46-inch and one 24 by 34-inch hot and two 22 by 42-inch cold); part of this machinery was formerly in the dismantled Anchor Mills at Pittsburg; product, iron and steel planished sheets, uniform blued polished sheets, and smooth black and common sheets; annual capacity, 10,000 tons. A planishing department, with 12 heating furnaces, was completed and put in operation on October 14, 1905. Fuel, natural gas.—The rolling mill may be completed in January or February.

Kenton Iron and Steel Co., Covington, Kentucky. Works at Mason City, West Va. Construction commenced in 1904; not completed in December, 1905; to be equipped with 4 single puddling furnaces, 2 scrap heating furnaces, 2 finishing furnaces, 2 trains of rolls, (one 10 and one 16-inch), and one 5,000-pound hammer; product, bar iron and steel; annual capacity, 15,000 tons. Brand "Kenton." Fuel, coal.—Work suspended on account of legal proceedings; may be resumed in 1906.

Wills, E. Cooper, P. O. Box 418, Bluefield, West Virginia. One 5,000-pound Wills converter, built in 1905 but not yet in place; 2 cupolas; product, steel castings; estimated annual capacity, 9,000 tons. Fuel, coke and oil.—Will probably be ready for operation in May, 1906.

American Steel and Tube Co., Lorain, Ohio. Building one combination mill at Lorain for the manufacture of muck bar, sheet bars, slabs, plates, sheets, skelp, tubing, etc.; annual capacity, from 50,000 to 75,000 tons. One 12-inch guide mill, with an annual capacity of from 20,000 to 30,000 tons of finished bars and angles, may be added in 1906.

Bechtold Crucible Steel Co., 307 Schofield Building, Cleveland, Ohio. Building works at Canal Dover, Ohio, to contain one 36-pot crucible steel-melting furnace, one 5-

gross-ton acid open-hearth steel furnace, 2 trains of rolls, (one 10-inch and one 12-inch,) and 3 hammers (one 500-pound, one 1,200-pound, and one 3,000-pound); product, all kinds of hammered and rolled crucible and open-hearth tool steel and castings; alloys a specialty; annual capacity, 2,700 tons of crucible steel ingots and castings, 4,500 tons of open-hearth steel ingots and castings, and 5,000 tons of rolled or hammered products.

Byesville Works, United Sheet and Tin Plate Company, Diamond Bank Building, Pittsburg. Works at Byesville, Ohio. One 50-gross-ton Siemens basic open-hearth steel furnace partly erected in 1903.—Work suspended.

Graham-Phillips (The) Horse Shoe and Iron Co., 210 Traction Building, Cincinnati. Building works at Hooven, Ohio, to be equipped with 2 heating furnaces and 2 trains of rolls; product, horse and mule shoes, bar iron, and bar steel. Fuel, bituminous coal.—Will probably be completed in April, 1906.

Menough (The) Foundry Co., Incorporated, Wellsville, Ohio. Now makes light and heavy gray iron castings; adding one 2-gross-ton side-blown Adams steel converter; product, to be light and heavy castings; estimated annual capacity, from 3,000 to 5,000 tons of steel castings.—Converter will probably be ready for operation early in 1906.

Prescott (The) Co., Menominee, Michigan. Built in 1899-1900; adding 2 cupolas and two 3-gross-ton Fisher steel converters; construction commenced July 1, 1905; product, electrical, saw mill, and general castings; annual capacity, 5,000 tons. Also makes forgings and gray iron, brass, and bronze castings. Steel department may be completed in February.

Bucyrus (The) Co., South Milwaukee, Wis. Building one 10-gross-ton basic open-hearth steel furnace; product, steel castings; annual capacity, 4,500 tons.—To be ready for operation in February.

Shaw (The) Crucible Steel Co., Damon Point, Washington. Building works for the manufacture of high-grade tool and alloy steels from magnetic iron sand; construction commenced November 9, 1905; to be equipped with special steel furnaces and hammers.—May be ready for operation in April, 1906.

Pig Iron and Scrap Bloomaries.

Pennsylvania Swedish Iron Co., 307 Empire Building, Pittsburg. Building a forge at Cheswick, Pa.; construction commenced in November, 1905; being equipped with 8 knobbling fires, one refinery fire, and 2 hammers (one 4,000-pound and one 6,000-pound); product, hammered blooms and billets made from charcoal pig iron and scrap for the use of the company in its rolling mill and for sale; annual capacity, 6,000 tons. Fuel, charcoal. Six additional knobbling fires may be installed in 1906.—Will probably be completed in January, 1906.

Tinplate and Terne Plate Plants.

Meuer Brothers Co., 575 Flushing avenue, Brooklyn. Building works at Long Island City, New York. Construction commenced July 1, 1905; to be equipped with 6 Jumbo and 3 open stacks; product, tinplates and terne plates; weekly capacity, 5,000 boxes. Fuel, coal. Will buy black plates.—Will probably be completed in January, 1906. The company also operates a tin and terne plate plant at Brooklyn. When the Long Island plant is completed the Brooklyn plant will be dismantled.

Minnequa Works, Colorado Fuel and Iron Company, Denver, Col. Building tin plate and terne plate departments at Pueblo; work commenced in February, 1902; to be equipped with 22 sets, 17 for tin plates and 5 for terne plates; estimated weekly capacity, 8,000 boxes of tin plates and 2,000 boxes of terne plates.—Time of completion indefinite.

BOOK REVIEW.

Machine Design.—By Albert W. Smith, Director of Sibley College, Cornell University, and Guido H. Marx, Associate Professor of Mechanical Engineering, Leland Stanford Jr. University. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Cloth; 6 x 9¼ inches; 369 pages; 31 tables and 279 figures in the text. Supplied by *The Iron Trade Review* for $3.

Nearly every college professor of machine design seems to be dissatisfied with the existing treatises on the subject, and he either uses Unwin, supplemented by his own lectures and mimeographed notes, or else endeavors to write a book himself which shall treat the subject as he thinks it ought to be treated. The result is that during the past few years there has been something of an overproduction of books on "Machine Design," which more or less completely, in the minds of their authors, fill the "long felt want." All of these books are good, in spots, and some are better than others. The volume before us is one of this class. It is a good enough book to have on the shelf for ready reference and it is a hard enough book for college students to wrestle with and give them some sort of mental discipline.

The first four chapters of the book are really not machine design but kinematics, and the fifth chapter, "Energy in Machines," belongs to theoretical mechanics. The following chapter on "Proportions of Machine Parts as Dictated by Stress," might be expected to be a somewhat complete treatise on this subject, but it actually occupies only fourteen pages and deals with general propositions and not with proportions at all. Riveted joints take up 27 pages and the treatment appears to be fairly complete. Bolts and screws also are treated in a very satisfactory way, as are also keys, set-screws and shrink and force fits. Sliding surfaces, such as slides of engines and planers are treated very briefly and axle shafts and spindles far too briefly to be satisfactory to the engineer. Journals, bearings and lubrication cover 25 pages. The authors state on page 175, "Modern experiments on friction and journals show that the coefficient of friction increases with the increase of velocity of rubbing surface (at speeds above 100 feet a minute)." This is a very incomplete statement of the results shown by Wellington and Tower, which show that the coefficient of friction is reduced greatly from low speeds up to 110 feet a minute and that beyond that the coefficient increases only as the square root of the speed. The decrease in the coefficient of friction with increase of temperature, found by these experimenters, also is omitted by the authors. Roller and ball bearings are treated in a chapter of ten pages, the most of the space being taken up in descriptive matter. Two pages are devoted to formulae for proportioning ball and roller bearings and nothing said about the advisability of using such bearings in machine design nor of the difficulties which have been found with them in practice. Couplings and clutches are treated very briefly and very few data are given for designing such couplings. Friction clutch couplings have only a few lines devoted to them. Belts and rope drives are concisely treated in a chapter of 25 pages; fly wheels in 15 pages. Toothed wheels or gears have 46 pages devoted to them, including forms and proportions of teeth, strength of teeth bevel gears, spiral gearing, worm gearing, etc. Spiral gearing is discussed in a very few lines and nothing is said about the amount of power such gears can transmit at different velocities. Worm gears are treated much more fully. Springs have only five pages devoted to them and the reader is referred to other au-

thorities for further information. A brief chapter treats of the forms of machine supports, but nothing is said about the proportions of such forms required to resist the stresses of the machine and reduce vibrations. The method of supporting machines on three legs is described, but nothing is said about the more modern method of doing without the legs entirely and carrying the frame of the machine down to the solid concrete foundation.

The last chapter treats of machine forms, discusses methods of proportioning an open side frame for a punching and shearing machine and then makes an attempt to show the method of proportioning the frame of the side crank steam engine. It is doubtful if any engine frame could be successfully designed in this way. The customary method of copying from existing designs and continually adding more pig iron as customers get to be more willing to pay for it seems to be a much better method. The same may be said of the attempt to design a frame for a steam hammer, in which as the authors say the resulting force is indeterminate. The chapter concludes with a design of a crane frame and of a frame of a steam riveter, which seem to be worked out quite thoroughly.

The appendix of seven pages is devoted to a mathematical method of determining the position of the slider crank chain corresponding to the maximum velocity of the slider. As this can be determined to a sufficient degree of approximation to truth by the simple graphic method, this chapter may be considered of more use to students as a discipline in mathematics than as anything important in machine design.

One common defect of modern text books is that the authors strive too much for originality. They are not content to accept the good old definitions of the standard text books, but must re-write them in different and generally worse language. An example is the following:

"A force is one of a pair of equal, opposite, and simultaneous actions between two bodies by which the state of their motion is altered, or a change in the form or condition of the bodies themselves is effected."

Another is the definition of work: "the name given to the result of the forces in motion." The old definition, "The product of the force into the space through which the force acts," or "The product of the resistance into the distance through which it is overcome," is much better.

Mechanics is defined as a science which treats of the action of force upon "free bodies." "Free" should be omitted. On page 320, the moment of inertia is given as a certain number of bi-quadratic inches. We thought that bi-quadratic inches had disappeared from mathematics many years ago. They belong to four-dimension space.

The book may be recommended to students as another fairly good book on machine design, not good enough to replace any of the older ones, but nevertheless worthy of a place alongside of them.

What is really needed is a treatise on machine design which shall be twice as large as this one, which shall treat of all the things that are contained in Unwin and all the more important things that are in Reuleaux with modern methods of design included and useful details and formulas for dimensions; but such a book cannot be written by any college professor in this country unless he takes a two or three year vacation in which to do it.

The Lake Shore Engine Works, Marquette, Mich., has delivered to the Shenango Furnace Co., Hibbing, Mich., a large double hoist to be used in mining operations on the Mesabi range. Without "trimmings" the machine weighs 70,000 pounds and is capable of hoisting two six-ton skips in counterbalance. A duplicate is in process of manufacture for the Lincoln mine of the Jones & Laughlin Co.

THE COMBUSTION OF COAL GRAPHICALLY EXPLAINED.

BY HORACE ALLEN.

One of the reasons why the numerous attempts to reach anything like perfection in the combustion of coal, by specially designed furnaces and appliances have not been as successful as expected is due to the fact that proper consideration has not been given to the relative *units of time* required to develop the proper combustion of the volatile and fixed components. If coal were a homogeneous material there would not be any great difficulty in devising means for its economical combustion, but the question is complicated by the fact that the volatile constituents, which form a considerable proportion of coal, are liberated completely by the application of a temperature below that at which the fixed carbon enters into combination with oxygen.

Again, the volatile gases evolved from coal, by the raising of the temperature, cannot be made to enter into combination with the oxygen of the air unless the air is of such a temperature that, in the necessary quantity, it does not reduce the combined temperature of the volatile gases and air below the ignition point which is somewhere about 1,000 degrees Fahrenheit.

Of course where there is a flame temperature of even a very slight proportion, the evolution of heat rapidly propogates combustion through the whole volume of gas and air, but in the case of the fixed carbon there can be no rapid combustion unless there is a forced supply of air, bringing the combining constituents into intimate contact.

As there are so many varieties of coal it will be necessary for the purposes of this article to fix on a coal having a certain chemical composition, so the average composition of British coal has been adopted.

Percentage composition by weight of average British coal.

Ultimate Analysis.

Carbon	80.00
Nitrogen	1.20
Oxygen	8.00
Hydrogen	5.00
Sulphur	1.25
Ash	4.00
	99.45

Proximate Analysis.

Fixed Carbon	61.00
Volatile Matter	33.75
Ash	4.00
Sulphur	1.25
	100.00

The theoretical amount of air necessary for the perfect combustion of the coal under consideration would be

$$12.6 \times 0.8 + 35.8\left(0.05 - \frac{0.08}{8}\right) + 5.35 \times 0.0125 = 11.579 \text{ pounds}$$

at 32° F. the volume = 144.7 cubic feet.

The fixed carbon and sulphur would require

	lbs.	%	C. ft.
$12.6 \times 0.61 + 5.35 \div 0.0125 =$	7.753	67	97
leaving for the combustion of the volatile gases	3.826	33	47.7
	11.579	100	144.7

The combustion of the fixed carbon does not commence until the volatile gases have been completely driven off by the effect of heat.

The thermal value of the coal, total per pound, equals

$$14{,}500 \times 0.8 + 62{,}000\left(0.05 - \frac{0.08}{8}\right) + 4{,}000 \times 0.0125 = 14{,}130 \text{ B. T.U.}$$

Allotting the thermal value to the fixed and volatile constituents:—

Fixed	$14{,}500 \times 0.67 + 4{,}000 \times 0.0125 =$	8,895	or 63 per cent.
Volatile		5,235	or 37 per cent.
Total		14,130	100

In a number of experiments made by the author upon some samples of Derbyshire coal, having a composition approximately that of the average analysis adopted for consider-

ation, it was found that when subjected to the action of heat in an ample supply of air the relative rate of combustion was approximately:

After numerous experiments to determine the manner in which coal burns in air under the usual conditions in boiler furnaces, etc., the following method was found to give fairly approximate results:

The sample of coal was ground very fine, and placed in a fine sieve; a minute portion was dropped by tapping upon a shallow porcelain basin, highly heated by a Bunsen burner.

By means of a stop-watch the time was noted at which the volatile gases were released, the interval between the complete evolution of the gases, and the commencement and completion of the combustion of the fixed carbon. From a number of experiments the rate of combustion given in the diagrams was determined and as the experiment does not necessitate expensive apparatus, while it gives an approximately accurate result, it can readily be repeated with any quantity of coal.

From the accompanying diagrams it will be seen that if the air supply is so proportioned as to perfectly consume the volatile gases, as evolved, there will be a great excess passing through the furnace during the combustion of the fixed carbon; while if the air supply is in proportion to the rate at which the fixed carbon can be consumed under a certain set of conditions the volatile gases will pass out of the furnace unconsumed, for though the volatile gases will not ignite unless the air is heated up to the ignition point, the same may be said in respect to the consumption of the carbon. An air supply based upon the theoretical quantity necessary will not be sufficient to ensure the complete combustion of the volatile gases while it will be in excess of that required during the time the carbon is burning.

Attempts to prevent smoke by various devices have failed generally to accomplish this with an economical supply of air.

The volatile gases cannot enter into combustion unless the air is of the necessary temperature. Cold surfaces in contact with flame tend to reduce the temperature of the gas and air below the ignition point with the result that combustion is imperfect and carbon is deposited, or carbonic oxide is present in the products of combustion. Unless the air is heated to the necessary ignition temperature no perfect combustion can take place, whatever volume of air is admitted.

A glance at the diagrams will make apparent the difficulties in regard to the accomplishment of anything like perfect chemical combination. The ignition temperature of the evolved volatile matter would not be lower than about 1,000 degrees Fahrenheit. On the diagram is plotted, for comparison, the usual necessary amount of air, found by practice, to prevent the presence of unconsumed carbon in the products of combustion, i. e., 24 pounds per pound of coal, and a little study of the diagram will make it clear that by whatever design of furnace, or special application for causing the thorough intermingling of the gases and the air, the air supply has to be in excess of that theoretically required to the amount of about double, and the loss due to the heat carried out by the excess of air cannot in practice be much reduced. It is not necessary to go into the question of the loss of heating effect due to the admission of an excess of air, or that resulting from the presence of unconsumed gases in the products of combustion, as these points are fully explained in all text books.

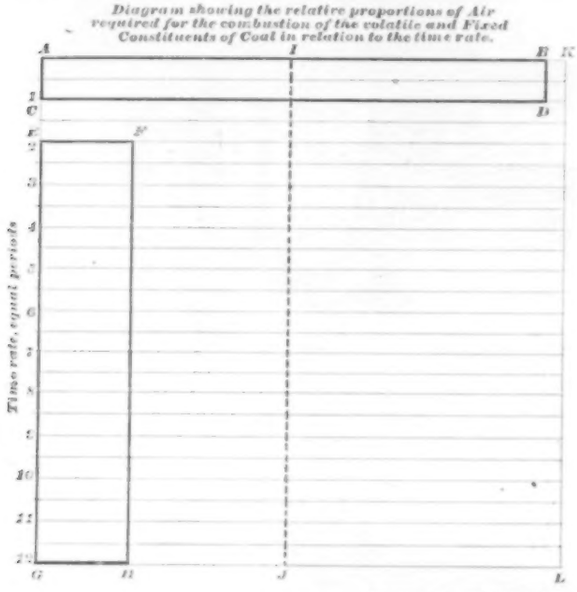
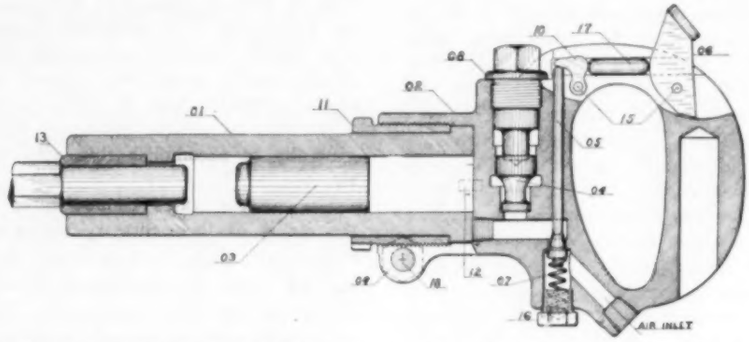


Diagram showing the relative proportions of Air required for the combustion of the volatile and Fixed Constituents of Coal in relation to the time rate.
A
I
B
K
C
D
E
F
G
H
J
L
Time rate, equal periods
A.B.C.D. Air required for Volatile Constituents, i.e. 3.83 lbs. per lb. of Coal
E.F.G.H. " " " Fixed " " 7.75 " " " " "
A.I.G.J. average rate of air supply without regard to the time rate of combustion of constituents, i.e. 11.58 lbs. per lb. of Coal
A.K.G.L. Rate of Air supply found necessary by experience in Boilers i.e. 24 lbs. per lb. of Coal

CHART TO ILLUSTRATE THE COMBUSTION OF COAL.

GREEN PNEUMATIC HAMMERS.

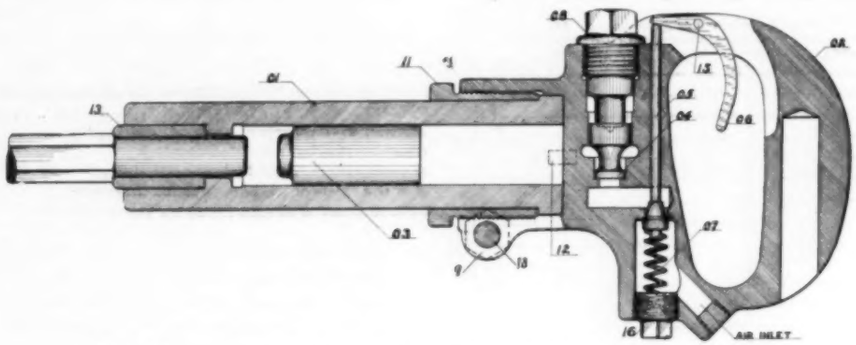
The accompanying engravings show sectional views of three classes of "Green" pneumatic hammers, one being the long stroke riveting hammer and the others the chipping and caulking hammers, of which two types are made. While a great many good points are claimed for these hammers, the first and most important relates to their simple construction, as they were designed with a view to reducing the cost of maintainance and embodying such features of construction as will give them ample strength to withstand the severe service which such tools must perform.



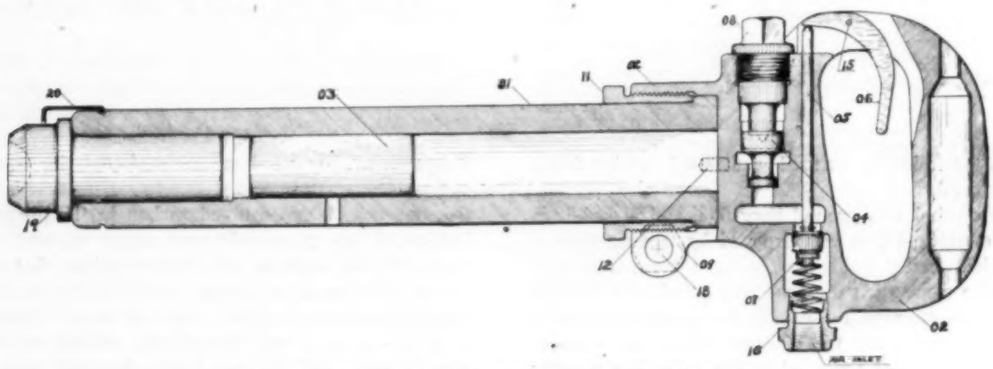
"GREEN" PNEUMATIC CHIPPING OR CAULKING HAMMER, OUT SIDE TRIGGER.

The line of hammers manufactured range in sizes from 1-inch up to 10-inch stroke, with capacities suitable for all classes of chipping, caulking, flue beading, riveting, etc. Chipping and caulking hammers can be furnished with trigger on inside or outside of handle, as preferred. The long stroke riveting hammers are made with one style trigger only, which is on the inside of the handle, thus acting as a safeguard to a certain extent against the accidental discharge of the hammer. The parts in the chipping and caulking hammers are all interchangeable between the various size tools with the exception of the cylinders, which are of different lengths according to stroke. In the long stroke hammers, the same style parts of a larger size are used, all of which are interchangeable between the various size tools with the exception of the cylinders and pistons.

The valve mechanism, which is the life of a pneumatic hammer is free from complication. The valve is a double piston, the most simple type obtainable. Live air is taken past its two ends and exhausted through the annular space between its two heads. It is perfectly balanced, is positive in action, and in addition to the laps provided, it is given a flat seat at each end of its stroke to eliminate leakage regardless of wear. The valve block usually used in this class of tools is entirely dispensed with, the valve being placed vertically in the head block of the handle with the throttle valve directly behind it. This arrangement gives the most direct passage of air from hose to the hammer cylinder, and results in a higher cylinder pressure, producing a hard and quick blow of the piston, and also making it possible to operate the



"GREEN" PNEUMATIC CHIPPING OR CAULKING HAMMER, INSIDE TRIGGER.



"GREEN" PNEUMATIC LONG STROKE RIVETING HAMMER.

hammer on a very low air pressure. The valve is easily accessible, and can be removed without disconnecting the handle from the cylinder. The best tool steel is used in its construction, which is hardened and ground to gauge, and is perfectly interchangeable.

The throttle valve is of the poppet type and is made of brass to prevent corroding and sticking. It is accurately balanced and graduated, giving thorough control of the hammer from the lightest to the heaviest blow. Only one longitudinal air port is used in the cylinders of the chipping hammers, and three in the cylinders of the long stroke riveting hammers. Complete information covering these tools is contained in a new catalog recently issued by the manufacturer, The Dayton Pneumatic Tool Co., of Dayton, Ohio.

TWIN DRILLING MACHINE FOR SPINDLES, AND A DUPLEX DRILLER.

The Moline Tool Co., Moline, Ill., is building a twin drilling machine for drilling spindles. This machine is

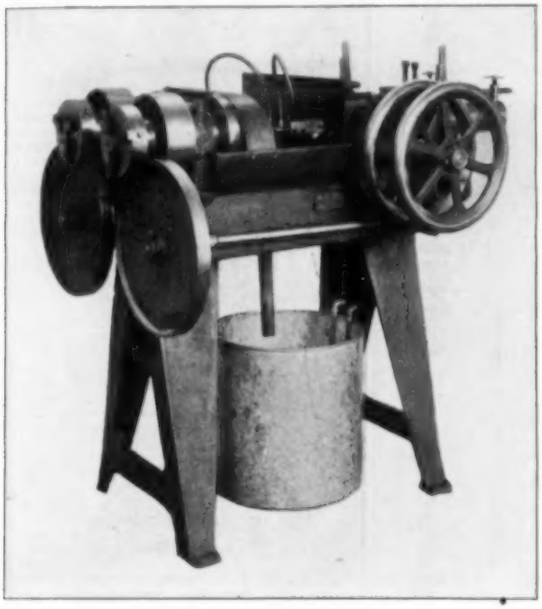


FIG. 1.—TWIN DRILLER FOR DRILLING SPINDLES.

shown in Fig. 1. A universal chuck is provided at each end so that the bars or spindles to be drilled are held perfectly true at each end. The spindles of the machine have a 1½-inch hole through them. Oil tube drills are

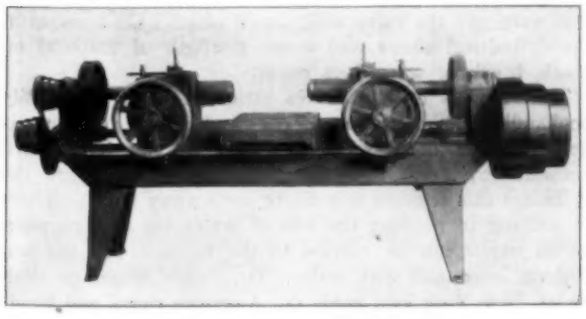


FIG. 2.—DUPLEX DRILLING MACHING.

used, which are held in swinging sockets, in order that the drills may be swung out of the way, to allow a centering tool, held in a traversing quill, to be run to the work and hold it absolutely true.

Holes four inches deep can be drilled on the machine. The quills are provided with an automatic stop and a quick return. Each drill is lubricated by a pump driven from the feed mechanism, so that no oil is pumped when the feed is thrown out. A double countershaft is provided making the operations of the two spindles entirely independent.

Another machine built by the same company is the duplex driller shown in Fig. 2. The machine will drill I or channel beams up to 14 inches wide. Each spindle has eight inches traverse, and is bored for No. 4 Morse taper, and is 2 7-16 inches diameter at the smallest part. The machine has three changes of speed and three changes of feed, and is provided with an automatic stop and a quick return.

THE SCULLY PRESSED STEEL BOILER LUG.

The Scully pressed steel boiler lug, recently placed on the market, is made of open-hearth flange steel 60,000 pounds tensile strength, and pressed in an hydraulic press. The thicknesses and dimensions are approximately the same as other pressed steel lugs on the market, but the same as merit of the Scully boiler lug is in its shape, which, as shown in the cut, has a strong center rib giving it exceptional strength and stiffness. The fact that the lug has no side

SCULLY PRESSED STEEL BOILER LUG.

flanges, makes it very easy to rivet and handle in every way.

In a test recently conducted by Messrs. R. W. Hunt & Co., two standard 48-inch Scully lugs were bolted to a cast iron block and supported on 25¼-inch centers. The pressure was applied and the lug stood a maximum load of 64,780 pounds. At the end of the test the lugs were bent but showed no fracture.

The Scully lugs are made in both the standard type and the special eastern type. The Scully Steel & Iron Co., Chicago, carry a full stock of all sizes in their warehouses.

A. I. E. E. Building Fund.—The General Electric Co. in view of the great importance and utility of the United Engineering Building, as a home and center for the engineering professions and arts, has made a contribution of $25,000 to the land and building fund of the American Institute of Electrical Engineers. President C. A. Coffin, who takes a warm personal interest in the matter, has also sent his own check for $5,000. The committee, which had already received gifts and pledges amounting to nearly $70,000, is greatly encouraged by this generous support of its work. The fund is now with other new subscriptions well over $100,000 and with renewed energy the committee has begun its canvas of the field with the object of securing the second necessary $100,000. About 600 members have already subscribed to the fund, and the committee expects to have no difficulty in at least doubling this number. It has just issued to the whole membership a handsome pamphlet, illustrating and describing the new building in course of erection in New York city, and detailing the steps that have been taken by the associated engineering bodies to give effect to Mr. Carnegie's original gift.

A NEW GAS REVERSING VALVE.

There are two systems of reversing valves now in use in open hearth steel and glass furnaces:

(1) Valves that can be quickly reversed with only a small loss of gas. These valves may warp in the heat, causing leakage.

(2) Valves that are reversed more slowly. On account of the loss of gas during reversing, the pipe line of these valves must be kept closed by means of a special apparatus. These valves are stated to have several disadvantages, namely:—cooling off of the melting room by cold air entering at the furnace door, and loss of time. While a warping of the valve by back-pressure gas cannot be prevented, it was found that by closing the pipe line during reversing, a considerable saving in gas, i. e. fuel, was effected.

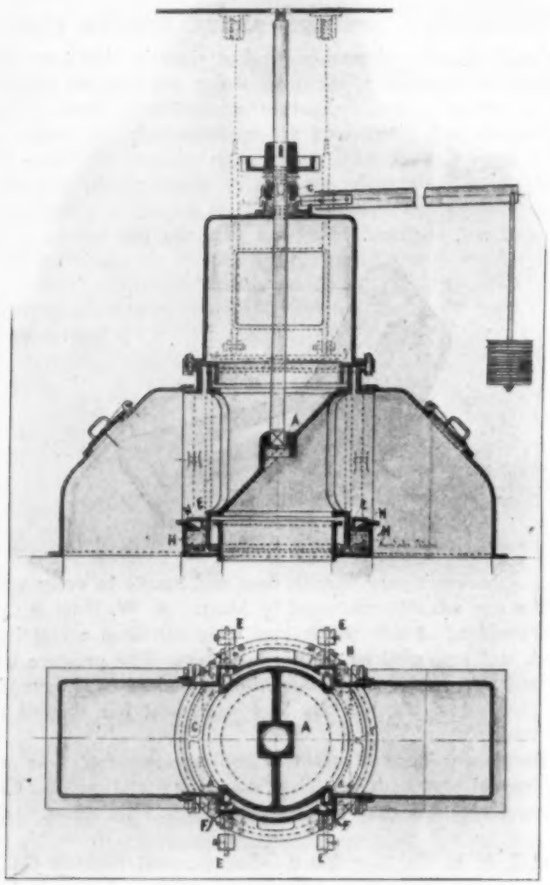


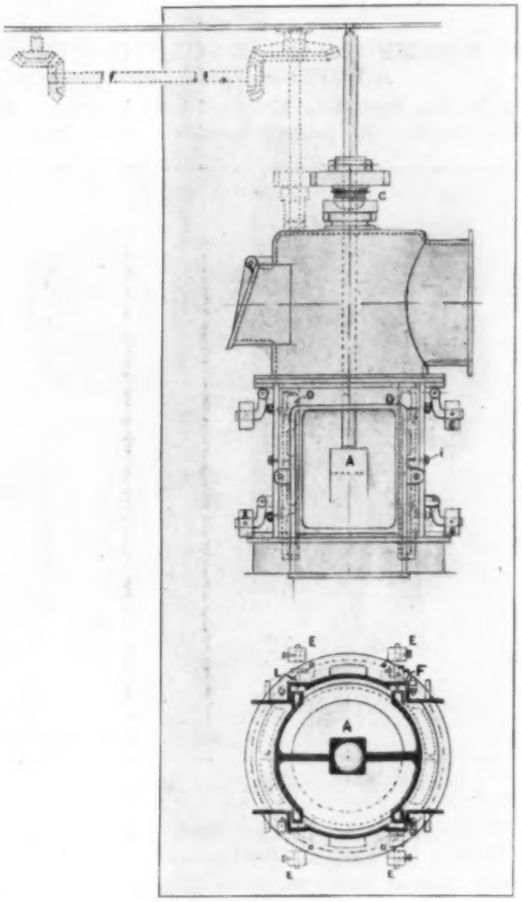
FIG. 1. SECTIONS OF FISCHER GAS REVERSING VALVE.

During the last few years the Fischer gas reversing valve has been successfully introduced into the most prominent German iron works. The simple construction is shown in the illustrations.

The Fischer valve consists of three main parts, namely, an inner cylinder, with a wall across; an outer cylinder which is made in four compartments with four ribs, and the base plate.

The inner cylinder *a*, Fig. 1, is pressed by the weight to the lower face *e* of the upper ring, whereby the upper joint is kept tight. The play between the inner cylinder and outer cylinder can be made as desired, and the connections between the two cylinders are made by four ribs, Fig. 1, which effect a tight joint on the sides. These four ribs are pressed by the weights *e*, against the inner cylinder. The ribs can be lifted by loosening the bolt *i*, Fig. 2, whereby a connection is made from producer to stack for burning out the pipes, etc. The lower joint is made tight by having the inner cylinder resting in sand, *k*, Fig. 1 on the base plate. The pieces *n* prevent a throwing out of the center. The inner cylinder rests in ball bearings, which allows easy handling, and whereby an absolutely horizontal position of the inner cylinder is effected.

Leakage of gas through the valve or to the stack is made impossible. The gas and waste gas is shut at the same time by a half turn; therefore gas cannot escape to the stack, the heat remains in the furnace and loss of gas is absolutely prevented. The gas cannot light nor burn in the valve so that neither the outer nor the inner cylinder will warp and the valve will remain intact. On account of the cylindrical shape and equal strength of material no crack, break or warp does occur.



PLAN AND ELEVATION OF FISCHER GAS REVERSING VALVE.

The valve is durable, takes little space and can easily be handled. The friction of the sand during reversing is decreased by balls, so that the valve can be worked without any great effort. In using water between the cylinders this friction is entirely done away with. There is nothing to prevent the use of water for this purpose, as no vapor can be carried to the furnace, the gas not coming in contact with water. Dr. Oskar Nagel, 90 Wall street, New York city, holds the American rights and builds these valves in this country.

The Scully Steel & Iron Co., Chicago, of which A. B. Scully is president, held its first annual dinner at Vogelsang's restaurant in that city Tuesday evening, January 2. All the department heads, salesmen and other employes were present.

Stock Market Steady at End of Week.

The feature of the past week in financial and stock circles was the stubborn fight for relief from the monetary stringency which during the closing days of the year had reached the most acute stage of the fall and winter business. Relaxation from abnormal rates for call money was finally secured, but not until late in the week, and the market, during the course of the hammering, was weak and irregular. The heaviest dealing was in the two hours' session of Saturday when New York Exchange sales were an even million shares: the total sales for the week aggregated over 6,750,000 shares. In addition to unfavorable money conditions, other perplexities arose to embarrass traders. Gold shipments to South America were heavy, foreign gold reserves fell off to a suprising extent, and the warning of Banker Jacob H. Schiff, delivered before the New York Chamber of Commerce, to the effect that a panic of unprecedented proportions was in prospect unless there was speedy reform in our currency system, was widely discussed and had a depressing effect on the market. But in spite of these discouraging factors, a number of industrial securities were the basis of heavy trading and in several instances netted good advances, principally late in the week. American Locomotive was dealt in almost to the 200,000 share mark, and netted a gain of 1⅜ points: Crucible Steel issues at Pittsburg advanced to the highest level in more than a year; Tennessee Coal & Iron, after weakening the previous week, developed sudden strength and went up 8 points; U. S. Cast Iron Pipe gained almost as much, and General Electric, American Car & Fdy., and Colorado Fuel & Iron shared in the advance movement. Steel stocks were market features, common selling over a half-million shares and closing the week at the highest point reached in three years.

Financial Notes.

With operating expenses not yet exactly determined, it is estimated that the Pennsylvania Steel Co. will show a net income for the fiscal year ending Dec. 31 of over $3,250,000, after interest and other fixed charges are deducted. The total income for 1905 is placed at above $4,000,000, making the year one of the best in the company's history. Heavy charges against the net income will be made for improvements and depreciation.

The LaBelle Iron Works has declared a quarterly dividend of 2 per cent payable Feb. 1; the Youngstown Sheet & Tube Co. has declared its regularly quarterly dividend of 1¾ per cent.

President French of the Railway Steel Springs Co., estimated the earnings of that company for 1905 at $1,700,000, a gain of $610,000 over the earnings of 1904.

The American Car & Foundry Co. reports for the quarter ending Oct. 31: Net earnings, $717,739; preferred dividend $525,000; surplus $192,739; previous surplus $12,505,746; total surplus $12,698,485.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation Dec. 30	Closing Quo. Jan. 7	Changes	Date of 1906 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Date Last Div. Dec.
Allis-Chalmers Co	22⅛	23½	+1⅜	Sept.	100	19,830,000	.....	.....	.....
Allis-Chalmers preferred	62	63	+1		100	16,150,000	7 cum	.....	Feb., 1904
AmericanCan	10	10	.....	Apr. 24	100	41,233,800	.....	.....	.....
AmericanCan preferred	69¼	69¼	.....		100	41,233,300	7 cum	5 Q.	Jan., 1906
AmericanCar and Foundry	40¾	40⅝	.....	June 28	100	30,000,000	.....	.....	May, 1905
AmericanCar and Foundry preferred	100¾	100	— ⅜		100	30,000,000	7 n. c.	7 Q.	Jan., 1906
AmericanLocomotive	76	77¾	+1⅝	Oct. 16	100	25,000,000	.....	.....	.....
AmericanLocomotive preferred	117	117½	+ ⅜		100	24,100,000	7 cum	7 Q.	Jan., 1906
AmericanShipbuilding	57	57	.....	Oct. 2	100	7,600,000	4	4 Q.	Dec., 1905
American Shipbuilding preferred	104½	103	—1½		100	7,900,000	7 n. c.	7 Q.	Jan., 1906
American Steel Foundries	14¾	14¾	+ ⅜	Oct. 3	100	17,700,000	.....	.....	.....
American Steel Foundries preferred	50⅝	50⅜	— ⅜		100	17,700,000	6 cum	.....	Aug., 1904
Barney & Smith	20	18	—2	June 5	100	1,000,000	.....	.....	June, 1893
Barney & Smith preferred	126	125	—1		100	2,500,000	8 cum	8 Q.	Dec., 1905
Bethlehem Steel	33	32	—1	April 3	100	15,000,000	.....	.....	.....
Bethlehem Steel preferred	89½	89	— ½		100	15,000,000	7 n. c.	7 Q.	Nov., 1905
Bullock Electric preferred	114	114	.....	Oct. 2	100	1,000,000	6	6 Q.	Jan., 1906
Cambria Steel	30¾	31⅜	+ ⅝	March 20	50	45,000,000	6	3 S. A.	Aug., 1905
Cambria Iron	49	50	+1		50	8,468,000	4	4 S. A.	Jan., 1906
Colorado Fuel & Iron	56½	57½	+1⅛	Oct. 15	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	25	25	.....	May 31	100	6,098,000	5	.....	Nov., 1902
Crucible Steel	13¾	14	+ ¾	Oct. 17	100	25,000,000	.....	.....	.....
Crucible Steel preferred	70	74	+4		100	25,000,000	7 cum	.....	Sept. 1903
Empire Steel	6	6	.....	Feb. 28	100	2,281,400	.....	.....	.....
Empire Steel preferred	39	39	.....		100	2,500,000	6 cum	3 S. A.	Jan., 1905
Fay & Egan	95	95	.....	Feb. 20	100	1,000,000	5	5 Q.	Nov., 1905
Fay & Egan preferred	120	120	.....		100	1,000,000	7 cum	7 Q.	Nov., 1905
General Electric	177	179½	+2½	May 8	100	48,256,050	8	8 Q.	Jan., 1906
International Pump	26	28	+2	June 5	100	12,262,500		2	July, 1905
International Pump preferred	78	80⅜	+2⅜		100	8,850,000	6 cum	6 Q.	Nov., 1905
Lackawanna Steel	81	81	.....	March 14	100	34,971,400	.....	.....	.....
Lake Superior Corporation	18	18⅝	+ ⅛	Oct. 3	100	40,000,000	.....	.....	.....
Niles-Bement-Pond	121	121	.....	Feb. 7	100	5,000,000	6	6 Q.	Dec., 1905
Niles-Bement-Pond preferred	103¾	103¾	.....		100	2,000,000	6 cum	6 Q.	Nov., 1905
Otis Elevator Co	60	58	—2	March 19	100	6,350,300		2 A.	Apr., 1905
Otis Elevator Co. preferred	107	106	—1		100	5,589,500	6 n. c.	6 Q.	Jan., 1906
Pittsburg Coal Co	15	14¾	— ¼	Feb. 12	100	30,135,000	.....	.....	.....
Pittsburg Coal preferred	62	60	—2		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	55	54⅞	— ⅛	Feb. 21	100	12,500,000		3	Aug., 1904
Pressed Steel Car preferred	100¾	100¾	.....		100	12,500,000	7 n. c.	7 Q.	Nov., 1905
Pullman Palace Car	245	245	.....	Oct. 18	100	74,000,000		8 Q.	Nov., 1905
Railway Steel Spring	61	61¼	+ ¼	March 1	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	105	103½	—1½		100	13,500,000	7 cum	7 Q.	Dec., 1905
Republic Iron & Steel	34	33⅜	— ⅝	Oct. 17	100	27,352,000	.....	.....	.....
Republic Iron & Steel preferred	106¼	106¼	+ ¼		100	20,852,000	7 cum	7 Q.	Jan., 1906
Sloss-Sheffield	89½	88¾	— ¾	March 14	100	7,500,000	5	5	Jan., 1906
Sloss Sheffield preferred	110	105	—5		100	6,700,000	7 n. c.	7 Q.	Jan., 1906
Tennessee Coal & Iron	131½	139½	+8	May 15	100	22,552,800		4 Q.	Jan., 1906
U. S. Cast Iron Pipe & Foundry	45⅝	51⅞	+6	June 27	100	12,500,000		1	Dec., 1905
U. S. Cast Iron Pipe & Foundry preferred	94¼	95	+ ¾		100	12,500,000	7 n. c.	7	Dec., 1905
U. S. Steel	43½	44⅜	+ ¾	April 16	100	508,302,500		.....	Dec., 1903
U. S. Steel preferred	103¾	103⅞	— ⅛		100	360,281,100	7 cum	7 Q.	Nov., 1905
U. S. Steel 5's	96⅞	97	+ ⅛		100	463,798,000	5	5 A.	
Virginia Iron, Coal & Coke	50⅝	50⅞	+ ⅜	Sept. 18	100	8,641,600	.....	.....	.....
Westinghouse Electric	170	174½	+4½	June 27	50	20,906,350	10	10 Q.	Jan., 1906
Westinghouse Air Brake	153	152	—1	Oct. 2	50	10,990,450	20	20 Q.	Jan., 1905

NEWS FROM MANY INDUSTRIES.

New Buyers:—

The Rock Springs Stone & Ore Co., Gadsden, Ala., has been incorporated for $15,000 to develop iron ore properties. A. H. Quinn is president and W. F. Johnson Jr., secretary-treasurer.

The Patent Hot Water Heating Co., Washington, D. C., has been incorporated with a capitalization of $150,000 to manufacture stoves, furnaces and heating systems. The officers are: H. T. Offterdinger, president; D. H. Fenton, vice president and treasurer; H. Gardner, secretary.

The Chattanooga Iron & Coal Co., Chattanooga, Tenn., has been incorporated with a capital stock of $500,000 by F. V. Berry, A. C. Conn, H. Bond and others to mine coal and iron.

The Leversedge Bridge & Construction Co., Fort Worth, Tex., is a $10,000 concern recently incorporated by L. S. Leversedge, John H. Leversedge and others to build bridges, etc.

The Fridmullens Coal & Coke Co., Aracome, W. Va., (Logan post office) has incorporated with a capital stock of $150,000 to mine coal and manufacture coke. The incorporators include M. B. Mullens and May Mullens of Logan, C. D. Fridman of New Richmond, O., W. M. Fridman of Cincinnati and C. W. Campbell of Huntington, W. Va.

The Hotchkiss Foundry Co., Torrington, Mass., has been incorporated with the following officers: President, Walter A. Hotchkiss, secretary and treasurer, Henry S. Tallard and Charles F. Parent, director.

The Puget Sound Metals Co., Seattle, Wash., has been incorporated with $100,000 capital stock by Miles C. Moore, W. B. Moore, Ben C. Holt, H. McArthur and W. H. Adams.

The L. R. Helbing Co., Duluth, Minn., has been incorporated to deal in metals. The capital stock is $50,000 and the incorporators are: L. R. Helbing, R. D. Haven, William Beyer Jr., and George I. Walz.

The Keeper-Hart Iron & Steel Co., Alexandria, Ind., has been incorporated with a capital stock of $100,000 by Joseph G. Brannum, William D. Keeper, John R. Welch, Joseph E. Jeffries, Samuel G. Phillips, Charles Heart and John F. Maker.

The Mutual Iron Co., Duluth, Minn., has been incorporated with $100,000 capital stock by Frank Hicks, H. J. Grannis and C. M. Van Norman.

The Omaha Iron Store Co., Omaha, Neb., has been incorporated with a capitalization of $100,000 by H. I. Adams, Mrs. Grace Adams and L. C. Sholes. The new firm will do a general heavy hardware jobbing business in Omaha and Nebraska.

The Fostoria Pneumatic Tool Co., Fostoria, O., has been incorporated by Herman Lineweber, Ed. C. Bode, Theo. Wertz, F. C. Veore, J. D. McDowell and others. The capital stock is $10,000.

The Fridley Vospardt Co., Chicago, has been incorporated with $200,000 capital stock to manufacture metal builders' supplies. The incorporators are: Herman H. Vospardt, William Wilhartz and Albert S. Louer.

The Wyman & Gordon Co., Worcester, Mass., has been incorporated to deal in forgings with a capital of $300,000. The president and treasurer is L. T. Gordon.

The B. & L. Lubricant Co., Elizabeth, N. J., has been incorporated to manufacture lubricants for machinery, etc., and acquire the business of Beernald & Levin, at New York. The capital stock is $300,000 and the incorporators are: Frank A. Magowan, Frank B. Adams, Samuel Levin, Robert H. Winn, New York city; and B. C. Stickney, Elizabeth, N. J.

The Western Engineering Co., New York, has been incorporated to manufacture machinery, tools, hardware, etc. The capital stock is $30,000 and the incorporators are: Allan A. Swingley, Hotel Cadillac; George T. Weston, 56 Pine street, both of New York, and Charles E. Swingley, City Hall, St. Louis, Mo.

The Mount Vernon Interurban Real Estate & Construction Co., Mt. Vernon, N. Y., has been incorporated to construct buildings, bridges, etc. The capital stock is $50,000 and the incorporators are: J. Willett Fox and James M. Thompson, Yonkers, N. Y., and A. Murray Jenks, Mt. Vernon, N. Y.

The Connecticut Boiler Mfg. Co., Manhattan, N. Y., has been incorporated to manufacture boilers, etc. The capital stock is $5,000 and the directors are: George W. Behrens, George A. Honnecker, Jersey City, N. J., and Ernest J. Magen, New York city.

The International Sand-Lime Brick & Machinery Co., Manhattan, N. Y., has been incorporated to manufacture and deal in brick, machinery for making brick and building materials. The capital stock is $100,000 and the incorporators are: John F. Cloonan, James A. Bryne and Arthur McCausland, New York city.

The Runyon Concrete Machinery Co., Cleveland, has been incorporated with $150,000 capital stock by the following: F. R. Marvin, A. J. Pearson and William D. McTigue, of Cleveland, Clay M. Runyon, of Elyria, and Geo. W. Coleman, of Pittsburg.

The Robinson Co., Bangor, Maine, has been incorporated to deal in machinery with $100,000 capital stock. The president is C. L. Snow; treasurer, Frank Robinson and clerk, J. D. Rice.

The Lundin Steel Casting Co., Cambridge, Mass., has been incorporated to deal in steel castings, etc., with a capital of $25,000. The officers are: President, A. G. Lundin, 17 Taylor street, Neponset, Mass.; treasurer and clerk, W. A. Thibodeau, 95 Hammond street, Cambridge, Mass.

The Carlson Automobile Co., Brooklyn, N. Y., has been incorporated to manufacture boilers, machinery, tools, etc., with a capital stock of $15,000. The incorporators are: Charles A. Carlson, 1423 Pacific street; Chaliners Dale Jr., 992 Park Place, Brooklyn; Charles W. McKilvey 49 Wall street; and Arthur W. Opp, 15 William street, New York.

The Smith & Dorsett Co., New York, has been incorporated to manufacture sheet metal, glass, tile, slate, etc., with $30,000 capital stock. The incorporators are: James Smith, 214 East Thirty-sixth street; Albert Villaret, 327 East Eighty-third street, both of New York; and Timothy W. Dorsett, 277 North Grove street, East Orange, N. J.

The H. & M. Valve Co., New York, has been incorporated to manufacture valves, machinery, etc. The incorporators are: Arthur Herschmann, 63 East Fifty-ninth street; Julius A. Stursberg, 82 Leonard street; Charles C. Upham, 143 Liberty street; Robert F. Cartwright, 27th street and Eleventh avenue; V. L. Dunne, 146 Centre street, all of New York. The capital stock is $75,000.

The Acton Mining Co., Birmingham, Ala., has been incororated for $325,000 to mine and deal in coal and ores and manufacture and deal in coke. Among the incorporators are: C. C. Harvey, president of the New Orleans & Northeastern Railroad, who will be president of the new

company, W. J. Kelleher of New Orleans, and Frank Y. Anderson and F. H. Eaton of Birmingham.

New Construction :—

The Algoma Steel Co., Ltd., Sault Ste. Marie, Ont., announces that it is to add an open-hearth steel plant to its works. Plans are now under consideration, but no definite decision on them has been reached and no contracts have been let. W. N. Sawyer is general manager.

The Potter & Johnston Machine Co., Pawtucket, R. I., is building an erecting shop to its works which will be 70 x 149 feet and one story high. The company manufactures machine tools.

Benjamin Atha & Co., Newark, N. J., have awarded the contract for three 20-ton open-hearth steel furnaces to the S. R. Smyth Co., contractor and engineer, Pittsburg, Pa.

The Westinghouse Machine Co. has completed its branch plant at Attica, N. Y. It consists of five modern buildings of steel and brick construction. The machine shop is 100 by 250 feet, and it is expected that its length will be tripled in the near future. A foundry, blacksmith shop, pattern shop and power house complete the group of buildings which are to be devoted exclusively to the manufacture of mechanical stokers and gas producers. Five hundred men will be employed at the outset.

The Adamson Foundry & Machine Co., Akron, O., it is reported, is in search of a new site in that city where a more commodious plant can be erected than it now occupies.

R. H. Hoffman, Clarkston, Ore., is building a foundry and machine shop.

The open-hearth steel plant which the Follansbee Bros. Co. is to erect in connection with its present works at Follansbee, W. Va., will include three fifteen-ton basic open-hearth furnaces with a daily capacity of from 100 to 150 tons, and a bar mill equipped with heavy hammers, electric cranes, hydraulic shears, etc. A building 60 x 400 feet will be constructed.

The Newsom Archimedean Plowing Machine Co., St. Louis, will equip a building with thread-milling machines, hydraulic presses, oil-annealing furnaces, shapers, lathes, bending machines and similar tools needed in the manufacture of plowing machines. The company will erect its own factory buildings later. The officers are: J. Q. A. Newsom, president; J. N. Newsom, vice president, general manager and engineer in charge; C. N. Ring, secretary; and Hans Wulff, treasurer.

R. E. Smith, superintendent of motive power of the Atlantic Coast Line Railroad Co., Wilmington, N. C., has on file at his office the plans recently completed for the car and locomotive shops of the company to be built at Waycross, Ga., at a cost of $500,000. Among the buildings planned are roundhouse, oilhouse, storehouse, machine and erecting shop, blacksmith shop, coach shop, paint shop, planing mill, foundry, pattern storehouse, dry kiln and freight car repair shed. These will be of brick and steel construction. Building proposals will close Jan. 29.

The new plant of the Weller Rolling Mill & Forge Co. to be erected at Gadsden, Ala., will include a main building 80 x 300 feet of structural steel and stone. Modern rolling mill machinery will be installed for the manufacture of merchant iron and steel, with a probable daily output of 75 tons.

Parker & Topping are erecting an addition 30 x 90 feet to their foundry at Brainerd, Minn. They will make the castings for 1,000 stock cars which they are now building.

The Mead Drill Mfg. Co. has removed from Burdett to Geneva, N. Y. A foundry 50 x 100 feet, machine shop 50 x 100, warehouse 50 x 125, three stories, and an office building will be erected.

The Vandegrift-Conger Wrench Mfg. Co., Shelbyville, Ind., is to build a factory in that city. T. F. Vandegrift is president.

The Bird Iron Co., Ironton, O., has practically completed its furnace on the site of the old Lawrence furnace. Its daily capacity will be about 140 tons.

The Downie-Wright Co., Rapid City, S. D., is soon to erect a foundry and machine shop, plans for which have been prepared.

The Ohio Steel Wheelbarrow Co., Toledo, O., is to erect two buildings, one 60 x 125 and the other 60 x 250 feet. Herman A. Liebold is the architect and plans have been completed.

The Standard Pulley Co., Cincinnati, is soon to begin the erection of a new foundry, 110 x 170 feet, and a machine shop 65 x 170.

The Wm. B. Scaife & Sons Co., Pittsburg, has been given the contract for the erection for the Cherry Valley Iron Co., at Middlesex, Pa., of a structural steel engine house 50 x 100.

Contracts have been let for the construction of a boiler and engine house 42 x 50 feet for the American Car & Foundry Co., Detroit.

Fires:—

The Union Street rolling mill of the Susquehanna Iron & Steel Co., Columbia, Pa., sustained a small loss Dec. 30, when the oil house was destroyed by fire.

The foundry department of the Price-Evans Fdy. Co., South Chattanooga, Tenn., was heavily damaged by fire Dec. 30. Pattern shops and other departments of the plant were not reached by the flames, and the company was able to resume operations promptly.

General Industrial Notes:—

The controlling interests of the capital stock of the Colfax Mfg. Co., South Bend, Ind., were on Jan 1 transferred to the younger members of the Studebaker Bros. Mfg. Co. The new organization, which will continue the old name of the company, is as follows: president, Nelson J. Riley; vice president, Lloyd F. Weaver; treasurer and general manager, Frederick M. Pitner; secretary, Charles Arthur Carlisle. In addition to these the directors are: Col. George M. Studebaker, H. D. Johnson, J. M. Studebaker Jr., E. L. Kuhns and Schuyler Colfax; the following are stockholders only: Clement Studebaker Jr., F. S. Fish and W. R. Innis. The business was started about twenty years ago by Schuyler Colfax Jr., and was extended until it included a wide range of vehicles, harness and outfits. Improved manufacturing facilities have been secured and an aggressive campaign for both foreign and domestic trade will be waged.

The work of dismantling the plant of the Portsmouth Foundry & Machine Co., Portsmouth, O., has been practically completed. Most of the machinery was shipped to a steel plant at Birmingham.

The Musconetcong Iron Works blew out its blast furnace at Stanhope, N. J., last week. The furnace, which has been under the management of John S. Kennedy for the past seven years has run for 46 months, producing 118,225 tons of pig iron, having been banked only three months during the coal strike of 1903.

The Telegraph Signal Co., recently incorporated for $1,000,000 at Rochester, N. Y., will manufacture a device known as a "selector," by means of which it is stated, the train dispatcher has absolute control of all semaphores at all stations in his dispatching district without the assistance of operators. By means of this device, the moment a semaphore is placed in stop position at a station

its number is registered back to the dispatcher. James G. Halleran, president of the company, was for eleven years a train dispatcher.

Oscar Clausen, Edward P. Burch and Charles L. Pillsbury have formed a partnership for the practice of consulting engineering, with offices at 1208-10 Guaranty Bldg., Minneapolis, and 514-15 German-American Bank Bldg., St. Paul.

The plant of the Toledo Safe & Lock Co. was recently sold at sheriff's sale for $8,000 to Jonas Schwab, who held a bond issue of the company and bought in the works to protect his interests. The concern was capitalized for $25,000 and the building is said to have cost $20,000.

Trade Notes:—

The Pittsburg Reduction Co. is installing four Morgan continuous gas producers for calcining aluminum ore in its rotary kilns at East St. Louis, Ill. These producers are to replace a battery of the old style hand-fed type.

The Dayton Pneumatic Tool Co., Dayton, O., manufacturer of the "Green" pneumatic hammer, reports 1905 business as most satisfactory, an unusually large number of orders being received in December, despite the general tendency toward the end of the year to delay purchases until after the holidays. The company has recently ordered additional machinery for the Dayton works which will increase its capacity to about 300 hammers per month.

McMullen & McDermott of Philadelphia have the contract for the sub-structure and the Pennsylvania Steel Co. has the contract for the metal work for the $1,000,000 bridge of the New York & Long Branch Railroad over the Raritan river between Perth Amboy and South Amboy.

The Canadian Shipbuilding Co. will build for the Grand Trunk Railway a large steel car ferry for use on Lake Ontario. The engines will be of great strength, so that ice-breaking will be possible.

The Singer Mfg. Co., Elizabethport, N. J., is equipping all its hand fired gas producers with automatic feeds supplied by the Morgan Construction Co. It is expected that the cost of these feeds will be paid for in the savings effected in the fuel and labor bill during the first year of operation, in addition to making the gas supply uniform in quality and quantity.

The Auto Brass & Aluminum Co., Flint, Mich., has increased its capital stock from $25,000 to $75,000 in order to accommodate its rapidly growing business in the manufacture of automobile and motor boat accessories. The company began business shortly before Jan. 1, 1905, and found the market for its products much wider than anticipated, the Buick Motor Co. of Flint taking the greater part of its output, with business offered by other concerns far in excess of its capacity. The officers are: James W. Heines, president; J. George Snyder, vice president; Thomas D. Buick, secretary-treasurer; O. M. Nacker, sales manager; and F. A. Wade, purchasing agent.

The Kempsmith Mfg. Co., Milwaukee, Wis., on account of the excessive demand for its new improved types of milling machines, reports that it is adding thousands of dollars worth of new equipment to its shops and is rapidly pushing work on a two-story addition 45 x 75 feet. A new Corliss engine which will give the plant double its former capacity is also being installed.

That lime can be successfully burned in rotary kilns fired with producer gas has been demonstrated at Natural Bridge, New York, where the New York Lime Co. have recently put in successful operation a 100 ft. x 6 ft. rotary kiln. The gas is of the high quality made by the Morgan continuous gas producer, with automatic feed.

The Globe Rolling Mill Co., Cincinnati, has just installed a new 5-ton Niles electric hoist and a John's patent 15-inch beam shear in addition to its saw so as to facilitate shipment of orders. It is now carrying one of the largest stocks of finished materials in the central west.

The New Robb-Mumford Boiler Works, South Framingham, Mass., have installed four electric Northern traveling cranes and riveter hoists manufactured by the Northern Engineering Works, Detroit. Of these one is of 25 tons capacity, with a 50 foot span, and of four motor design, one is of five tons capacity with a 28 foot span and three motors, and two are electric riveter cranes of 20 and 15 tons' capacity and a fifty-foot lift.

The Ingersoll-Rand Co. announces that it has obtained exclusive control of the product of the Imperial Pneumatic Tool Co., with shops at Athens, Pa. The line of Imperial tools, including pneumatic hammers, drills, riveters, reamers, hoists and plug drills, will be offered in connection with the Ingersoll-Rand line of Haeseler pneumatic tools.

The Scully Steel and Iron Co., Chicago, has made a contract with Ruggles & Ruggles, Batavia, Ill., to sell the entire output for the next five years of the Ruggles' Perfection flue cleaner. This instrument is very ingeniously designed for cleaning boiler tubes. The cutters are always in direct contact with the metal and will override any imperfections of the tubes, such as blisters, welds, etc. The blades are also arranged on the heads in such a manner as to work like a plane, their tendency being to work deeper all the time. No screws or rivets are used in the construction of this flue-cleaner, and the heads or ends are made from drop forged steel.

TRADE PUBLICATIONS.

The Wheel Truing Brake Shoe Co., Detroit, Mich., is circulating literature dscribing the advantages of its brake shoe for truing worn or flat wheels.

The Falcon Bronze Co., Youngstown, O., is distributing a catalog illustrating its products. These include engine and mill bearings, valve seats, electric car and motor bearings, metal pickling cradles, etc.

The Crocker-Wheeler Co., Ampere, N. J., in bulletin No. 63, describes a line of large sized direct current type generators and motors. These machines range from 10 to 275 horsepower, and are built for voltages ranging from 115 to 550.

Edwin R. Kent, 8-10 S. Canal street, Chicago, has issued a catalog of high grade tool steel. The catalog contains 36 pages, and lists a large number of different brands, including high speeds and self hardening tool steels.

The Green Fuel Economizer Co., Matteawan, N. Y., describes fans, blowers and exhausters for heating and ventilating, mechanical draft, and other purposes in a recently issued booklet. Prices and dimensions of types of fans suitable for different purposes are given.

F. E. Meyers & Bro., Akron, O., describe a line of power pumps in a 48 page catalog which they are distributing. Many different types are shown of various sizes and capacities, arranged to be either belt driven or engine or motor driven. Descriptions and prices of auxiliaries and repair parts of the pumps are also incorporated in the catalog.

The Corrugated Concrete Pile Co., New York City, N. Y., has issued a booklet describing concrete piling. It is plentifully illustrated, showing the concrete pile in various stages of manufacture and the application of it. Comparisons are made between the concrete pile and the wood pile, both as to its durability, strength and cost. The catalog contains considerable information to the users of piles.